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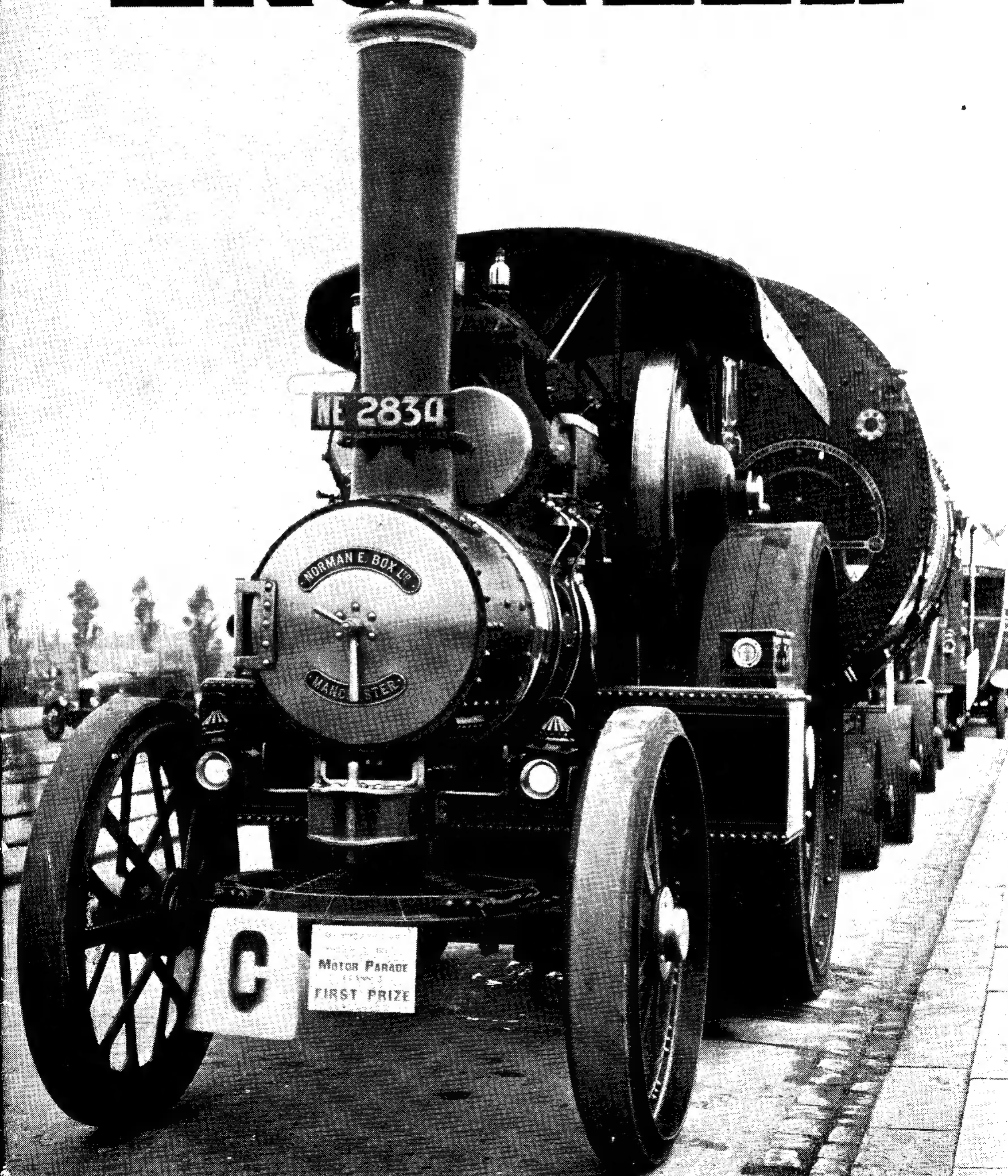
THE MODEL ENGINEER



The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

14TH FEBRUARY 1952 — VOL. 106 NO. 2647

SMOKE RINGS

Our Cover Picture

● THOSE READERS who have read the book *Traction Engines Worth Modelling* will recall a fine photograph of the Fowler "Big Lion" No. 16263 *Talisman*, taken when she won first prize in the Manchester Civic Week Parade in 1927.

Our photograph this week gives another view of this fine locomotive on the same occasion: it is reproduced by courtesy of Norman E. Box, whose firm owned fourteen "Big Lions" as well as other engines. The photograph should prove useful to readers building or contemplating building a model, but one or two points should be noted.

First, the name-plates on the smokebox door are those of the owners, and not of the builders. Secondly, the heavy eyelet fixed to the front axle is not a "standard" fitting, but was added to allow the winding rope to be used in a forward direction. Thirdly, no spud-pan is fitted to the front axle, such as is shown in the "M.E." blueprint. Rubber tyres made its use obsolete, of course.

The photograph is used especially this week to mark the commencement of a new series of articles by W. J. Hughes, entitled "Talking About Steam . . ." but the author points out that the old "bull-nosed" Morris in the background adds interest to the picture.

Another Traction Engine Race

● WE HEAR that as a result of the success of the traction engine race at Nettlebed, last June, a proposal is afoot to arrange another next June. The challenger is Mr. Kimble, an agent for agricultural machinery from Northampton, who thinks that his 50-year-old engine will be able to beat Mr. A. Napper's *Old Timer*, winner of last year's contest.

The intention is to run the race at Bridge Farm, Appleford, Berks, where the first traction engine race ever run was held. Mr. Kimble's engine is to be towed by a diesel tractor to the site while he will follow in an Auster aircraft which he will land in the field in time to get up steam for the race.

Dr. G. Romanes, of Bray, hopes to enter his Wallis & Steevens general-purpose traction engine, *Eileen*, for another attempt, and other contestants will be Mr. M. Chetwynd-Stapylton, of Didcot, and Mr. Bill Thame, with an engine built by Wilders of Wallingford.

We cannot help wondering why, of all the counties in England, Berkshire should be so traction-engine-minded in these days, and we hope to have the pleasure, in due course, of being able to announce the precise date of this proposed new race.

A Golden Opportunity

● MODEL GRAND PRIX enthusiasts in the London area will be pleased to hear that a splendid outdoor site, amid ideal surroundings, is being offered for permanent track erection. The location is alongside the Eel Pie Island Hotel, Eel Pie Island, Twickenham, and we have been informed by the party concerned that excellent facilities will be available.

Clubs or prospective club secretaries are invited to write to Mr. Michael Snapper, 38, Crescent Road, Kingston-onThames, who will be pleased to furnish further details.

A Second Gas-turbine Locomotive

● ON JANARUY 29TH we were invited to Paddington Station by British Railways to inspect the second gas-turbine locomotive, No. 18100, which has been designed and built by Metropolitan-Vickers Electrical Co. Ltd. This locomotive is an experiment entered into by the Great Western Railway and carried forward by the Railway Executive under the direction of Mr. R. A. Riddles. Its principal features were determined by the service requirements stipulated by Mr. F. W. Hawksworth, then Chief Mechanical Engineer of the G.W.R., and were that it should be suitable for hauling the heaviest passenger trains on the Western main routes, particularly that from London to Plymouth, and at speeds up to 90 m.p.h.

No. 18100 is capable of exerting a maximum starting tractive effort in the region of 60,000 lb.; the fixed tractive effort on continuous rating is 30,000 lb. Electrical transmission is provided as being the only practicable and reliable means of satisfying these conditions.

This machine, which is 63 ft. long over the body, 9 ft. wide and 12 ft. 6 in. high, is carried on two six-wheeled bogies, all the axles of which are driving axles. Internally, the body appears to be packed with machinery of novel and interesting kind. A comfortable driving cab is provided at each end, both being exactly duplicated; the driver's seat, for either direction of working, is on the right-hand side of the cab, and we were interested to note that the driving equipment is remarkable for its simplicity and comparative lack of "dashboard" instruments and indicators. The driver has four handles under his immediate control, one for starting, one for main brake, one for auxiliary brake (locomotive only) and one for reverse, this simplicity being deliberately planned to bring the driving technique within the capacity of the regular staff without highly specialised training.

Space forbids a detailed description of the technical equipment; we may be able to go into this at a later date. In the meantime, we shall be interested to note how this first English-built gas-turbine locomotive compares in service with No. 18000, the Swiss example which has been operating in the Western Region since February, 1949.

Craftsmanship Again

● FOLLOWING UP our comments in "Smoke Rings" for January 24th, we are pleased to discover that we are not alone in our opinion that the term "craftsman" is not only applicable to those who work with the traditional hand tools, or the primitive appliances of the past. In a copy of *The Bulletin of the Society of Ornamental Turners* before us as we write, we find, among other good things, some pertinent "Candid Remarks" on the subject, and they largely reflect our views. One very good comment we think is worth quoting:

"To stretch a point perhaps, would you not have regarded Pouishnoff, Paderewski, or Rachmaninoff as craftsmen though even they only pushed down little levers—ivory ones—in more or less rapid succession? The results surely entitle them to membership of the little band. Shall we call them craftsmen in acoustics?"

We are not quite sure about that last question; while we would agree that the three great pianists named were—or rather, *are* in the case of Pouishnoff—craftsmen in the production of pleasurable sound, by means of the supremely skilful manipulation of the mechanism of the piano, we doubt if this comes under the heading of acoustics.

But, after all, the man who can handle an ornamental-turning lathe and thereby produce exquisite work, is, in our opinion, a craftsman. He has to learn how to handle the lathe in just the right manner, or the results are ruined; and the learning how to do it involves hours of patient practice fully comparable with that required by any other craft.

An Invitation from Israel

● AT THE end of an interesting letter we have received from Mr. Eddy Misrahi, Kfar Hanasi Mobile Post, Upper Galilee 1, Israel, he writes:

Finally, could you pass this invitation to readers of 'Ours' (you included, of course); although travelling might be a bit expensive, we shall be delighted to have readers as guests down here. I cannot say that we have a wonderful life, but what we have is yours. Let them not worry about lodging and food! Furthermore, they will still feel at home, as 80 per cent. of my comrades are from England. Write to me for more information."

We pass on this invitation in the hope that it may catch the eye of any reader in some other part of Israel, or about to go to that country, who might be glad to take advantage of it.

Harrow and Wembley S.M.E. Changes

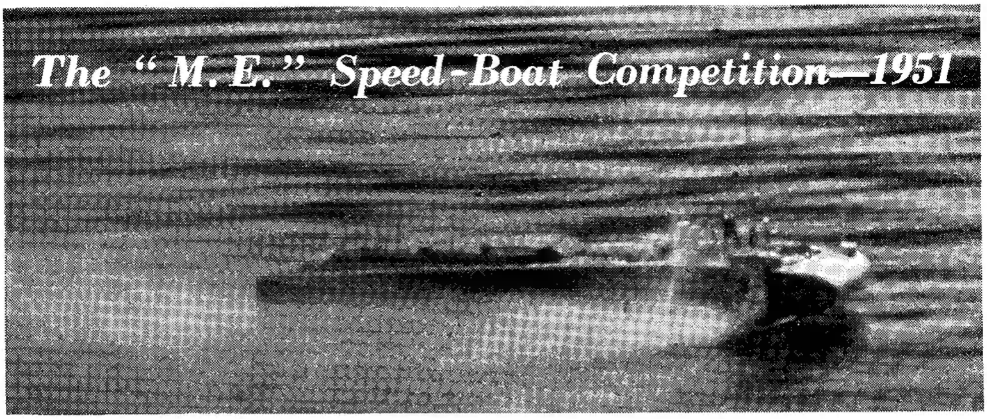
● WE HAVE received a report of the recent annual general meeting of the Harrow and Wembley Society of Model Engineers. The society's financial state is good and there has been much activity among the members during the year just ended. The principal event was the completion of the elevated loco. track at Headstone Lane.

There have been one or two changes in the executive officers; Mr. S. J. Hobson is now assistant secretary, Mr. S. L. Brown has been elected librarian, and the re-established office of entertainments and exhibition secretary has been taken over by Mr. S. R. Emery. So far as the committee is concerned, there have been two changes; Mr. E. R. Uphill has taken charge of the general section, and Mr. F. A. Cottam is now steward of the locomotive section.

The Late Mr. H. C. Lefevre

● WE REGRET to learn of the death, on January 26th, of Mr. H. C. Lefevre, who was a well-known and respected member of the staff of Bonds o' Euston Road. For about forty years, Mr. Lefevre had looked after the wants of the model engineer, and there is little doubt that he was able to start off many in the right direction in our hobby, and was always ready to give them useful advice in the many problems they would bring to him. He will be missed by many customers who came to regard him as councillor and friend.

The "M.E." Speed-Boat Competition—1951

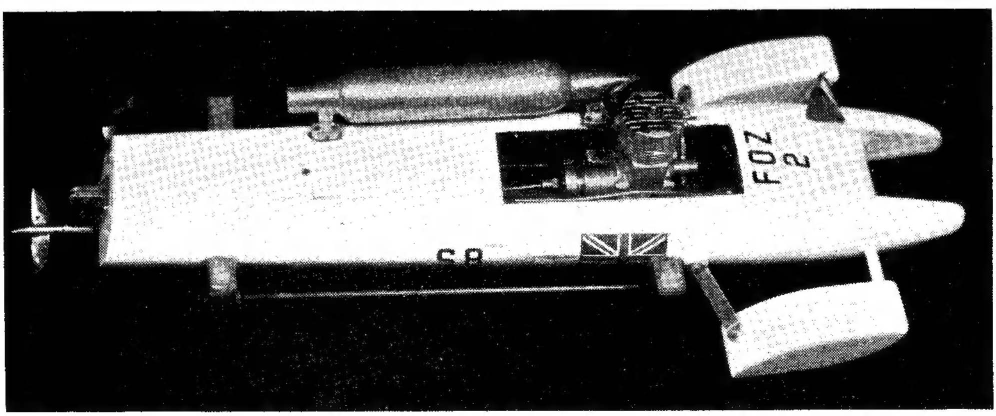


THE cult of the model speedboat represents perhaps the most active and progressive outlet for the talents of those who delight in experimental work ; it is a class of work which calls for infinite patience, resource and individual thought, and offers very little hope of consistent success to the dilettante. Critics have objected that the model speedboat is neither a "model" nor a "boat," but just an untidy freak, embodying little of craftsmanship or design, but this is a most unfair criticism which could never be made by anyone who had practical experience of the problems involved in producing models of this type.

While it would be quite correct to say that the shape and appearance of boats intended for high speed are very much at variance with commonly accepted principles of boatcraft, and that their power plants, designed to pack the utmost power into the minimum bulk and weight, bear no "scale" resemblance to those of full-size boats, there is nothing haphazard about their design or workmanship in either case. On the contrary, it is well known that only the utmost care in design, and meticulous accuracy in construction, can ever hope to achieve success in this field, and the fact that model speedboats often have an "untidy" or unfinished appearance is but a common characteristic of experimental work.

For nearly half a century now, the exponents of model speedboats have devoted untiring effort to the development of their craft, spurred on not so much by the hope of any material reward or kudos, as by the determination to beat the problems and setbacks which have presented a never-ending challenge to their recources. The story of their achievements has been told in many articles published in THE MODEL ENGINEER, including the reports of the annual "M.E." Speed-boat Competition, and has also been compiled in a concise form in the "M.E." handbook *The History of Model Power Boats*. From these accounts, it will be seen that from the very modest achievements of the early days (the first "M.E." competition, in 1902, was won at a speed of 5 miles per hour !) speeds have steadily risen, until at the present day, there are several boats capable of exceeding 60 miles per hour.

It will be obvious to discerning readers that this progress has necessarily been accompanied by proportionate development in the design of

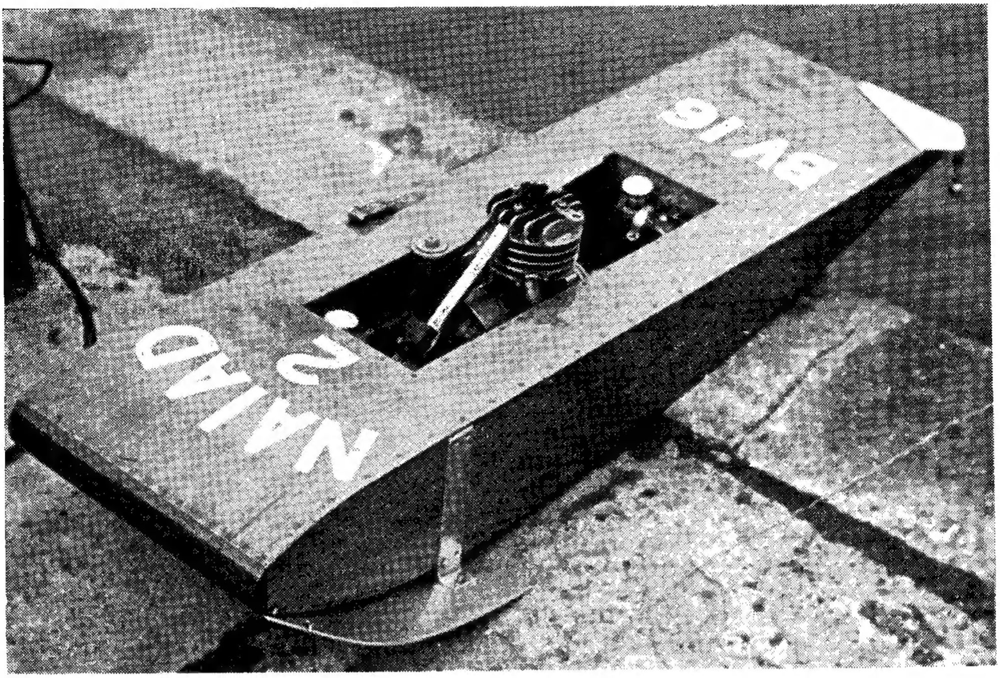


One of the most consistent "C" class boats, which has won honours both at home and abroad : Mr. Phillips's "Foz 2"

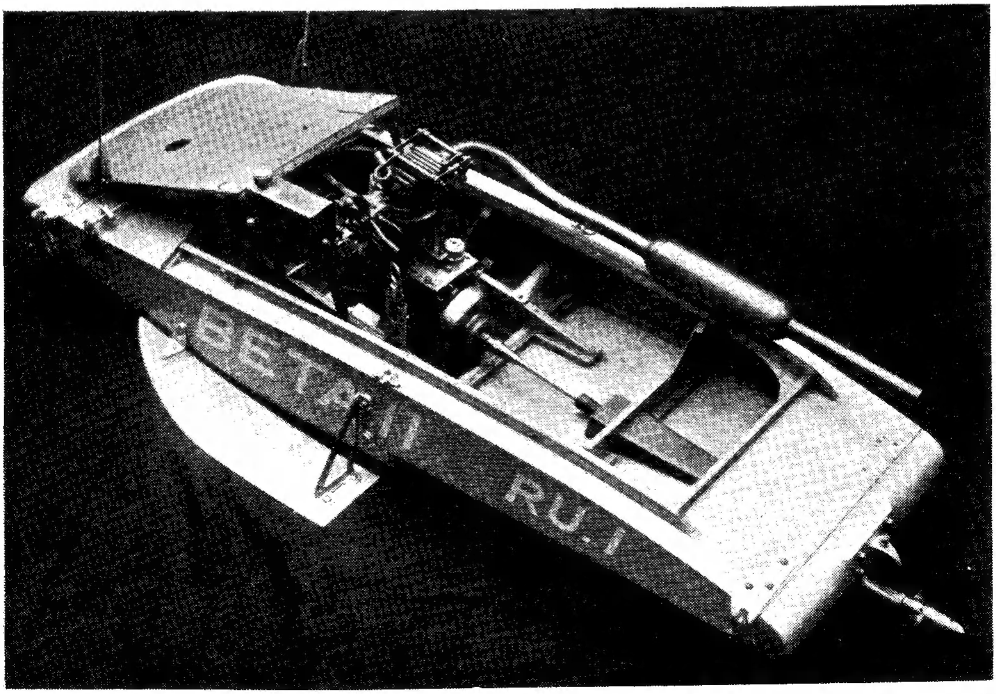
THE "M.E." SPEED-BOAT COMPETITION, RESULTS 1951

Name of Boat	Owner	Total Weight lb.	Engine: Cyls.	Engine: Type	Engine: Bore	Engine: Stroke	Hull: Length ins.	Hull: Max. beam ins.	Hull: Steps	Propeller: No.	Propeller: Dia. ins.	Propeller: Pitch ins.	Propeller: Blade area ins.	Propeller: Blades	Speed m.p.h.
			"A" Class—I.C. Engines												
Gordon 2 ..	E. G. Clark	$12\frac{1}{4}$	1	2-st.	$1\frac{7}{16}$	$1\frac{1}{8}$	38	16	1	1	$3\frac{7}{8}$	$6\frac{1}{2}$	2.5	2	70.1
Big Sparky ..	G. Lines	$9\frac{3}{4}$	1	2-st.	$1\frac{3}{8}$	$1\frac{1}{8}$	37	$13\frac{1}{2}$	1	1	$3\frac{3}{4}$	8	2.5	2	64.7
Blue Streak ..	S. H. Clifford	$10\frac{1}{2}$	1	4-st.	$1\frac{1}{4}$	$1\frac{7}{16}$	33	$10\frac{1}{2}$	1	1	$3\frac{1}{4}$	$6\frac{1}{2}$	—	2	60.1
Betty ..	J. B. Innocent	$11\frac{1}{2}$	1	4-st.	32 mm.	37 mm.	$36\frac{1}{2}$	$11\frac{1}{2}$	1*	1	$3\frac{1}{4}$	$6\frac{1}{2}$	2	2	58.7
Faro	K. G. Williams	$13\frac{1}{8}$	1	4-st.	$1\frac{5}{16}$	$1\frac{5}{16}$	40	12	1	1	3	6	1.84	2	58.77
Boxotrix ..	E. A. Walker	$10\frac{3}{4}$	1	4-st.	33 mm.	34 mm.	36	$13\frac{1}{2}$	1	1	$3\frac{1}{2}$	9	1	2	53.83
Orthon ..	J. H. Benson	7	1	2-st.	$1\frac{7}{16}$	$1\frac{1}{8}$	34	12	1	1	$3\frac{3}{4}$	7	2	2	53.3
			"A" Class—Steam Engines												
Ifit 7	A. W. Cockman	$15\frac{7}{8}$	2	s.a.	0.770	0.875	39	16	1	1	$3\frac{7}{8}$	8	2.2	2	52.45
			"B" Class—I.C. Engines												
Sparky II ..	G. Lines	7	1	2-st.	$1\frac{1}{8}$	$\frac{7}{8}$	38	13	1	1	$3\frac{3}{8}$	7	2	2	58.6
Nipper ..	M. de B. Daly	$6\frac{9}{16}$	1	2-st.	$1\frac{1}{8}$	$\frac{7}{8}$	$31\frac{1}{2}$	$10\frac{3}{4}$	1	1	$3\frac{3}{8}$	6	2.3	2	49.7
Beta II ..	R. E. Mitchell	$8\frac{3}{8}$	1	4-st.	1.07	1.0	32	$14\frac{1}{2}$	1	1	$3\frac{1}{4}$	$4\frac{1}{2}$	1.8	2	46.91
Naiad 2 ..	T. Dalziel	$6\frac{1}{2}$	1	2-st.	1.125	0.906	30	10	1	1	$2\frac{4}{5}$	6	1.75	2	46.49
Sparta II ..	N. F. Hodges	$6\frac{1}{2}$	1	2-st.	$1\frac{1}{8}$	$\frac{7}{8}$	$31\frac{1}{2}$	10	1	1	3	6	1.7	2	38.7
			"B" Class—Steam Engines												
Vesta II ..	F. Jutton	$7\frac{13}{16}$	1	s.a.	$\frac{7}{8}$	$\frac{7}{8}$	$28\frac{1}{2}$	$10\frac{1}{2}$	1	1	3	$7\frac{1}{2}$	1.75	2	48.5
			"C" Class—I.C. Engines												
Foz 2	R. A. Phillips	$4\frac{3}{4}$	1	2-st.	0.940	0.875	$28\frac{1}{2}$	12	1	1	$2\frac{15}{16}$	6	0.680	2	69.042
Don IIII ..	P. Ribbeck	2	1	2-st.	0.71	0.75	23	8	2	1	$2\frac{1}{2}$	6	2	2	51.37
Mephisto II ..	C. G. Stanworth	$4\frac{1}{8}$	1	2-st.	0.942	0.875	29	$9\frac{3}{8}$	1	1	$2\frac{7}{8}$	$6\frac{1}{2}$	0.566	2	51.04
Gamma ..	R. E. Mitchell	$5\frac{3}{16}$	s.s..	2-st.	0.74	0.70	28	12	1	2	$2\frac{3}{4}$	5	1	2	46.2
Dagwood ..	L. O. Barnes	$4\frac{1}{4}$	1	2-st.	$\frac{15}{16}$	$\frac{7}{8}$	29	$10\frac{9}{16}$	1	1	$2\frac{1}{8}$	$6\frac{1}{2}$	1.16	2	41.23

*With subsidiary "breaker" planes



One of three entries from the Bournville club : Mr. T. Dalziel's " B " class boat " Naiad 2 "



Mr. Mitchell's four-stroke engined " B" class boat, " Beta II," is noted for consistent, clean and quiet running

hulls and engines, and that the knowledge and skill acquired in the process has been a potent influence in the improvement in the design and construction of other types of models. Knowledge, like art, knows no frontiers, and experience gained in surmounting one kind of problem is almost invariably applicable to others in parallel lines of development.

For very many years, model speedboats, and their engines in particular, were developed entirely by the amateur enthusiast, and although within recent years, the possibilities in commercial development of miniature racing engines, and to a lesser extent hulls, have been exploited, the ingenuity and individuality of the amateur are still as necessary as ever to continued progress. In the "M.E." Speedboat Competition, only boats which have been built entirely by the competitors, including both hull and engine, are eligible for entry; and when it is considered that the work on them is nearly always carried out with very limited facilities, and often in very limited spare time, the results obtained are all the more noteworthy.

Mr. S. H. Clifford with his "A" class boat "Blue Streak"

No very radical changes in hull design have taken place within the last year or two, though there have been detail modifications to existing hulls, and some of the new designs embody individual features which may be said, as yet, to be still in the tentative stage. The principle of the "three-point" hull is now almost universally adopted, but its forms are many and various; some hulls have the forward planing surfaces built in or on to the floor of the hull proper, as in Mr. Innocent's *Betty*, others have "sponsons" built on the sides, as in Mr. Clark's *Gordon* 2, and Mr. Benson's *Orthon*, or metal "skates," as in Mr. Mitchell's two boats *Beta II* and *Gamma*. An increasing number of boats are now being built with "pontoon" type planing surfaces, in many cases being extended clear of the hull proper, as in Mr. Lines' *Sparky II* and *Big Sparky*. In nearly all cases, the problem in really fast boats is to obtain sufficient buoyancy and planing efficiency for a good take-off, without excessive planing surface which would cause the boat to be completely or partially airborne at very high speed. For this reason hulls with large single front planes are almost entirely obsolete, as such hulls have a tendency to turn a backward somersault when driven really hard, especially into a head wind. Even the double or gapped front plane is not always a complete cure for this, and all sorts of ideas to prevent or reduce airlift under the front of the boat are now being tried out.

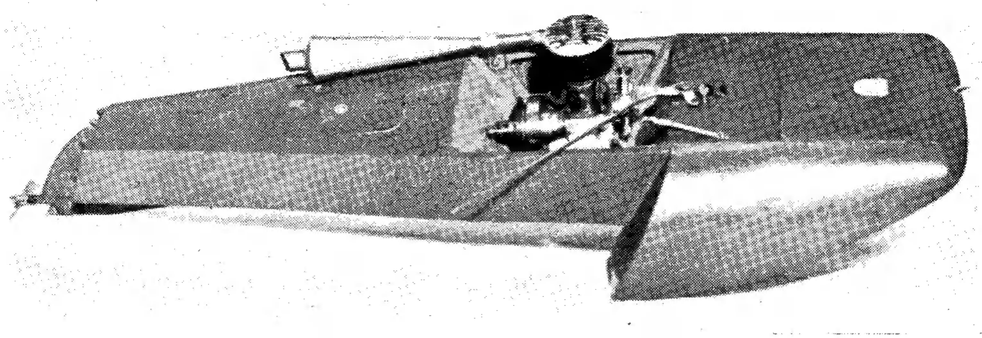
The "single-step" principle is still almost universal—in other words, the use of two *lateral* planing surfaces, or sets of planes—and there is little reason to believe that this could be improved upon for general efficiency, but an interesting modification of the principle is seen in Mr. Innocent's *Betty*, an old-timer which has made a most successful come-back to the modern arena. In this case, a small subsidiary plane (described by the constructor as a "breaker" plane) is built on the floor of the hull, forward of the main step, and both this and the main surface are gapped to reduce effective planing area. It is stated that the boat planes on five surfaces, namely, each side of the forward surfaces, and the stern floor, and that these remain in contact with the water at all speeds.

Construction of hulls is in all cases of wood, with the exception of certain structural fittings such as struts, cross-members and attached planes, and the time-honoured method of using a thin three-ply skin on a light but rigid framework seems difficult to improve upon. Balsa wood is used to some extent for fairing of sponsons or pontoons, but its use for main structural purposes is not generally favoured, owing to its low strength to resist impact and working stress, and its propensity for absorbing water, in spite of all attempts to proof the surface. Hull shapes are usually kept simple, but the once-favoured rectangular "kipper box" seems to have passed—with few, if any, regrets.

Propellers

All boats now use surface propellers, but this has brought about very little change in the design of the propellers themselves, and not so much increase as might be expected in pitch and diameter for a given engine power. This is to some extent accounted for by the higher r.p.m. which is possible with the surface propeller. Articulated propeller shafts are employed almost universally, as they enable adjustment of the line of thrust to be made without drastic alteration of the installation, but the extent to which they are called upon to accommodate angular discrepancies is much less than with fully immersed propellers.

The two-bladed propeller seems to be still the standard type, and although it is known that a good many experiments have been made with increased numbers of propeller blades, these do



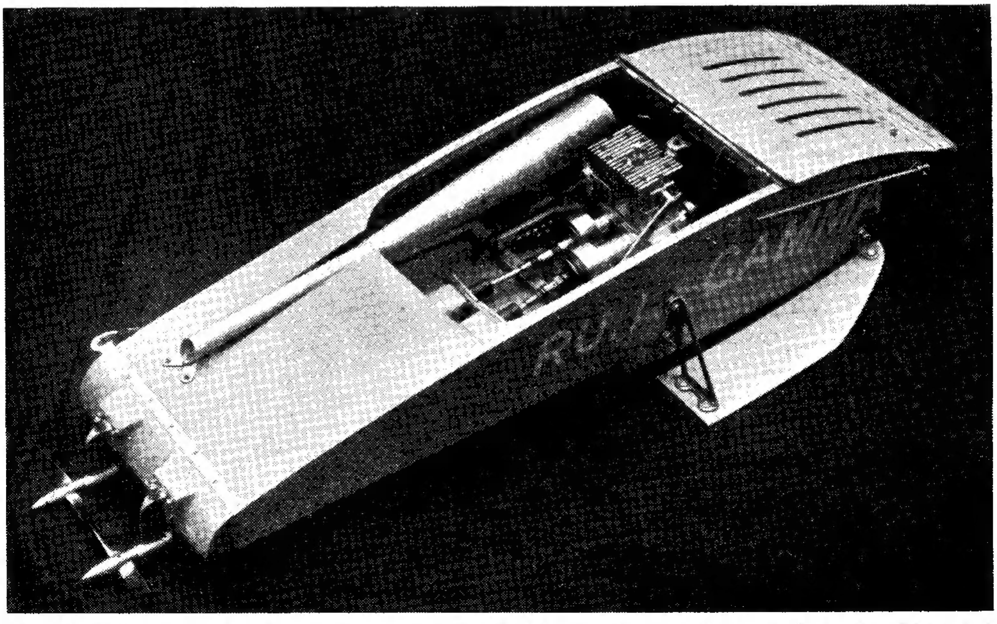
The Derby club is represented by " Dagwood " (" C " class) by Mr. L. O. Barnes

not feature in the particulars of the boats entered. There is a fairly wide difference in the blade areas of propellers for boats in a given class, and it would seem that propeller design is far from as becoming an exact science as ever. The only example of a twin-propelled boat is Mr. Mitchell's *Gamma.*

Engines

In " A " class, the four-stroke type of engine predominates, but there is only one example of this type of engine in " B " class, and none in " C " class. Both the engines of Mr. Williams's *Faro* and Mr. Clifford's *Blue Streak* have been fully described in THE MODEL ENGINEER. Mr. Innocent's *Betty* still has its original engine, so far as is known, but it embodies some detail improvements, and is now equipped with magneto ignition. The engine of Mr. Walker's *Boxotrix* is built to the " M.E." " Kittyhawk " design, with minor modifications ; another example of a pre-war design which has proved quite capable of holdlng its own under modern racing conditions. A description of the engine of Mr. Mitchell's *Beta II* has also been published in THE MODEL ENGINEER.

The two-stroke engines in all three classes follow principles of design which have been recommended in THE MODEL ENGINEER, including the use of disc type rotary admission valves. General tendencies in detail design are tending to become somewhat stereotyped, though one or two rather daring experiments in parting and other features have been made, such as in the



Mr. Mitchell's " C " class boat " Gamma " is fitted with a " split-single " two-stroke engine driving twin propellers

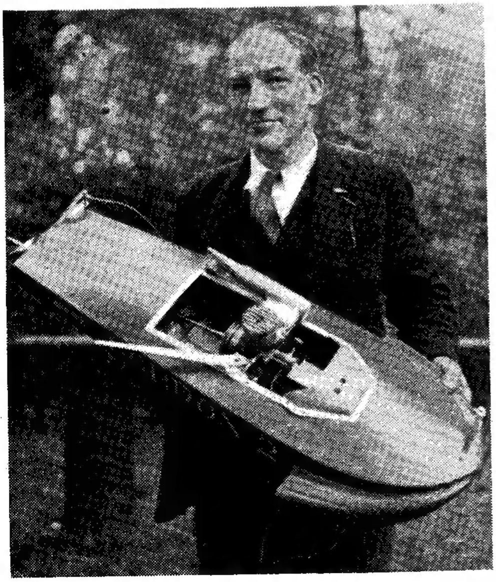
engine of Mr. Lines' *Sparky II*, which has recently been described in the "M.E.," and the "split-single" engine of Mr. Mitchell's *Gamma*. The engine of Mr. Stanworth's *Mephisto II* is based on the "M.E." "Ensign" engine, but is fitted with ball-bearings, and a modified cylinder head for glow-plug ignition.

All the two-stroke engines in the three classes employ the latter system of ignition, with the exception of that in Mr. P. Ribbeck's *Don IIII*, which is of the compression-ignition type. It may be mentioned that this engine is of only 5 c.c. and its performance against engines of twice the capacity is therefore all the more noteworthy. At present the number of home-produced engines of this size fitted to boats is very few, and does not justify the introduction of a new class of boats to suit their capacity.

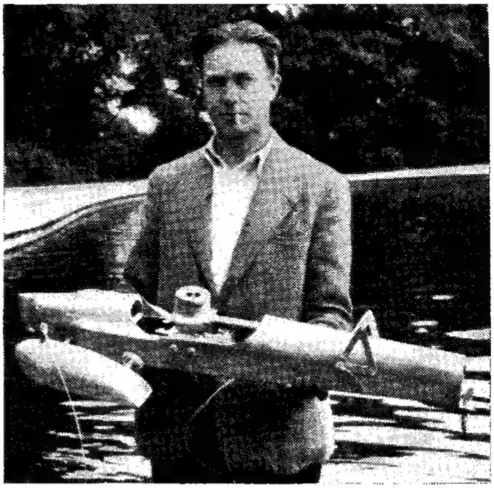
The two examples of flash steam boats, in "A" and "C" classes respectively, are well known to readers of THE MODEL ENGINEER. Mr. Cockman's *Ifit VII* is still fitted with the engine which was described some years ago in THE MODEL ENGINEER, though it has an entirely new hull; and Mr. Jutton's *Vesta II* (seen in the heading photograph), has had many modifications, and more or less extensive repairs and rebuilds, but the plant remains much the same as that in the article describing its construction, published in April, 1949.

Personal Notes

Most of the competitors in this competition are well known to THE MODEL ENGINEER, having featured in many regatta reports, and also in previous "M.E." Speedboat Competitions. These include pre-war veterans such as Messrs. Clifford, Cockman, Innocent, Williams and Walker, and some who have become famous



Mr. E. Clark with Gordon 2, holder of the "A" class record



Mr. G. Lines with his new "A" class boat "Big Sparky"

in more recent years, such as Messrs. Jutton, Mitchell, Lines, Phillips and Benson. Among the newcomers to this year's competition, Mr. E. Clark has made a spectacular debut with the highest recorded speed; but it should be pointed out that this is by no means "beginner's luck," as he has been a brilliant and determined, if somewhat sporadic, exponent of racing boats since well before the war, when his *Tiny* series of racing boats made many promising runs. His luck, however, has been varied, and he has had more than his fair share of disasters.

Little is known of the personal history of Mr. M. d. B. Daly, who makes his first appearance in "B" class, but from the results attained by his boat, we have reason to hope and expect that we shall hear more of him in the future. Mr. N. Hodges, a fellow-member of Mr. Lines in the Orpington club, has made steady but consistent progress with boats which appear to follow in the traditions of the *Sparky* family.

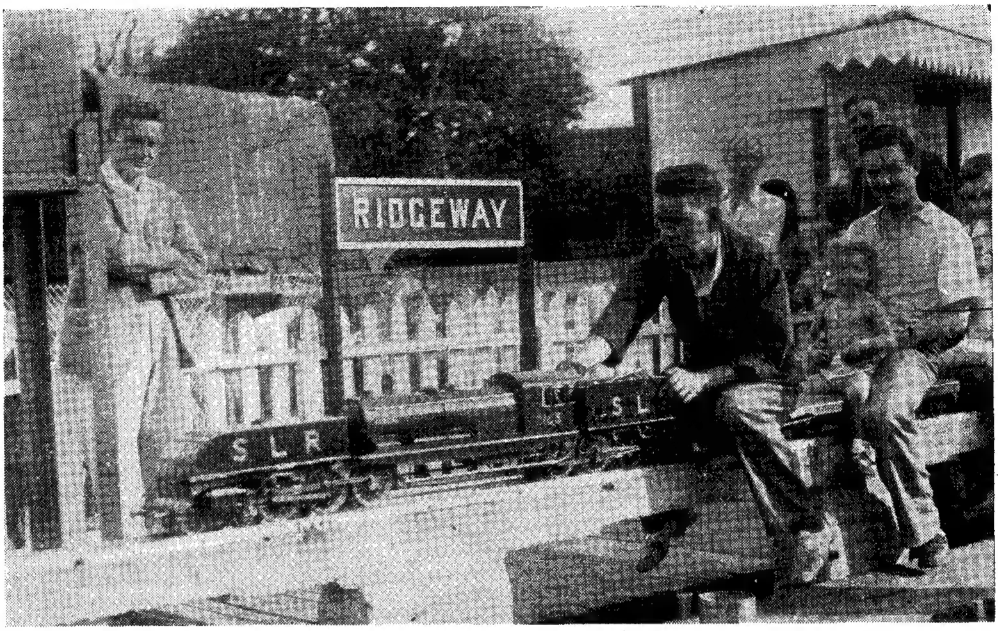
Mr. Ribbeck made a first appearance in last year's regatta, and fully upheld the honour of the Glasgow club, which has made many creditable contributions to model speedboat history in the past. His fellow-countryman, Mr. Dalziel, though an exile from his native land (he is a member of the Bournville club) has lost neither his accent nor the traditional Scottish engineering genius and determination.

The youngest, but by no means the least distinguished, competitor is Mr. Stanworth, another member of the Bournville club, who has been a regular performer at regattas in many parts of the country for the last three or four years, and has packed more activity and experience into this short time than some people could in a lifetime.

Without exception, all the competitors are to be congratulated on the success of their efforts, and we trust that few, if any, of those who read this report will question the policy of THE MODEL ENGINEER in encouraging the development of model speedboats.

Musings on Model Locomotives

by H. E. White



The writer's 4-6-0 + 0-6-4 *Beyer-Garratt-type engine at work on the Chingford track*

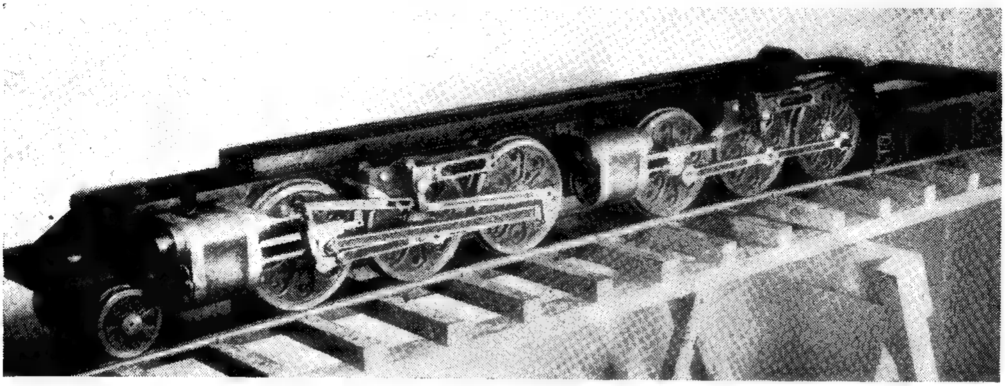
I OFTEN wonder why I took up locomotive work. Although I would not say that I am uninterested in full-sized engines, and railway matters in general, it was certainly not the sight or study of any full-sized locomotive which impelled me to construct a little one. I have always been interested in the properties of steam, and the steam engine, but my earlier model engineering work was mainly directed towards the production of high-speed plants for boats and aircraft. Perhaps it was the sight of a blazing coal fire through a tiny fire-hole door, seen at some forgotten exhibition visit, which affected my decision: in fact, I'm practically certain that it was. The fascination of a coal-fired boiler was, and still is, irresistible to me.

This, however, cannot be the only reason for my complete conversion to the designing and building of locomotives. To start with, I must confess somewhat unwillingly that there appears to be something sentimental about our mental attitude towards the steam locomotive, which springs from a sympathy with its ways and devices, and even with its history. Whether those engineers responsible for the design, building and operation of the full-sized engines feel this kind of inner prompting I do not know, but I strongly suspect that they do, otherwise how is it that so many of the folk who work on big engines are found amongst the members of our model engineering clubs and societies?

When I'm not actually flanging copper plates or turning cast-iron wheels (coming home from work is about the only time) and I get a few moments for contemplation, it sometimes occurs to me that the desire for the satisfaction of the creative instinct is very strong in our fraternity. The model engineer is so often regarded as the typical example of a "practical" man, with all the misconceptions to which the word usually gives rise. As a matter of fact, the typical model engineer is the outstanding example of a dreamer—a visionary whose urge to travel into the realms of fancy is so compelling that he must make the journey at all costs, even to the extent of sacrificing his entire leisure to make his dreams come true. The model engineer is a model superman—he is the reigning genius in an organisation which includes a chief mechanical engineer, drawing office, machine shops, foundry and stores, assembly and testing staff, fireman, driver, and maintenance department, all staffed by willing and co-operative workers, for whom no sacrifice can be too great to bring about the fulfilment of his purpose—each one being, in fact, himself!

The model engineer knows that all poetry is not concerned with "a primrose by a river's brim," and the joy of rhythm and the appreciation of harmonious sounds can give rise to aesthetic satisfactions which are not enjoyed by musicians alone. As for visual beauty, functionalism and art form are always fruitful subjects for contemplation: so many engineers—and locomotive men are far from the least among them—are

actively interested in the appearance of their work, that their preoccupation with visual perfection becomes ■ guiding principle. This last matter is, however, so highly controversial that I hesitate to pursue it : whilst no modern man would tolerate the appearance of ■ motor-car with its bonnet removed so that its working parts were exposed, many locomotive enthusiasts violently oppose the streamlining of ■ locomotive on grounds of appearance alone ! Indeed, it is in this beautifully finished creation is repulsive to them : how would they ever get the soot out of the flues ? A well-known prize winner at an "M.E." Exhibition told me, as we were looking round the locomotive exhibits, that he always looked inside the chimney liner of any well-made engine exhibited : if it was clean he lost interest ! Some of our constructor-only brethren have this complex—if I dare so describe this attitude—so acutely developed that they



Chassis of the writer's $3\frac{1}{2}$-in. gauge 2-6-6-4 *articulated engine in which* both *of the six-coupled driving units are pivoted, bogie fashion, to the main girder on which the boiler is mounted. Shown on a 25 ft. radius curve*

interesting to remember that a very large proportion of our fellow men—and women—probably see no beauty in ■ locomotive at all.

It would seem that there are three entirely different motives at work : we may merely desire to build an engine, or we may wish to own one, or we may have an uncontrollable urge to fulfil the engine-driving dream of our early youth. In my case all three motives are at work all the time, with somewhat queer results, for each motive seems to be jealous of the one which is being gratified. Whilst I am busy designing a new job, I am filled with impatience to get at the lathe. When the machining and fitting processes are occupying my whole time, I tell myself that I cannot afford to spend so much time at the bench, and that if I had my way, I would employ skilled men to get all this done much more quickly, so that I could see and handle the new engine in the shortest time possible. And when the engine is complete and ready for the road, ownership means little or nothing—I want to see it working, and master its idiosyncracies, and to feel it pull.

Many of my locomotive friends do not share these conflicting desires with me. Some like constructing engines, and find this in itself ■ sufficient reason for the work : they do not wish to design the job, and they choose the most advanced design they can find, so that the job will last as long as possible. When the engine is at last finished down to the last absolutely scale-sized hexagon head and the last correct line on the boiler bands, and it is standing ready to be measured for its glass case, they go out to seek consolation at the nearest hostelry, for life has lost its purpose. The idea of raising steam lose interest as soon as the machine-tool and fitting stage has been completed : boiler-smithing and plate-work appear to them to be such alien activities that they never get farther than the actual chassis. Having finished it they start on another. How many beautiful chassis have I seen on my way around which will never get ■ boiler or ■ cab, their purpose in life unfulfilled according to me, although not according to their makers.

Another, and very important, section of us has not the spare time, or perhaps lacks the ability, or even simply has not the desire to construct ■ little locomotive. These people just want an engine, and they take the necessary steps to acquire one—or even more—by such means as are at their disposal. These worthy fellow-dreamers either want to drive the engine themselves, or to see it driven, and they have my sympathetic appreciation. I wish I only wanted to own and drive the engines, but I am cursed with the greedy desire to taste the whole joy of locomotive engineering : no mere part of it would satisfy me, I'm afraid.

For consider the fascination of this hopeless obsession. In designing we are free to express in steel and bronze the wildest flights of our imagination, or to bring to life ■ reproduction of the most worshipped object of our adoration (in the locomotive world, that is). My own particular mad desire at present is to have what "1121" described as "handfuls of driving wheels" coupled with the ability to run around ■ 20 ft. radius circle. Ah, well ! It's no use asking why.

In the workshop, making an engine involves practically every possible engineering process, and what more could an amateur engineer want ? Turning, boring, milling, fitting : precision work

to the nearest half-thousandth, and some to the nearest one-eighth: welding, brazing, silver-soldering and soft-soldering, in fact, the whole gamut of metallic manipulation, is encountered including both machine-work and hand-work (the reader will excuse me whilst I go into the workshop to see if this is all true !).

But I have come to the conclusion that the most compelling fascination of the small locomotive is the fact that when it is finished, its maker has only just begun. It is then ready to justify the labour expended in its creation by its Pygmalionesque transformation into an active, snorting piece of machinery with all the characteristics of a living creature. It demands our constant attention, it must be understood, cajoled, pampered, worked for, cried over, fastidiously fed and watered, and in every way become a ruling passion in our lives. Perhaps Persian legend rather than Greek would provide me with the more apt allusion, for Sindbad's Old Man of the Sea comes forcibly to my mind. And yet, we continue in our sad drugged ways, for even whilst the current engine is in the fitting shop, another engine is in the process of mental gestation, and the drawing board is sometimes fetched out of its corner even before the present engine is ready for testing.

But perhaps I am not typical in my gluttonous desire for further creation and satisfaction, perhaps the happy locomotive man makes one perfect engine, and spends the rest of his life learning to drive it perfectly: I do not know.

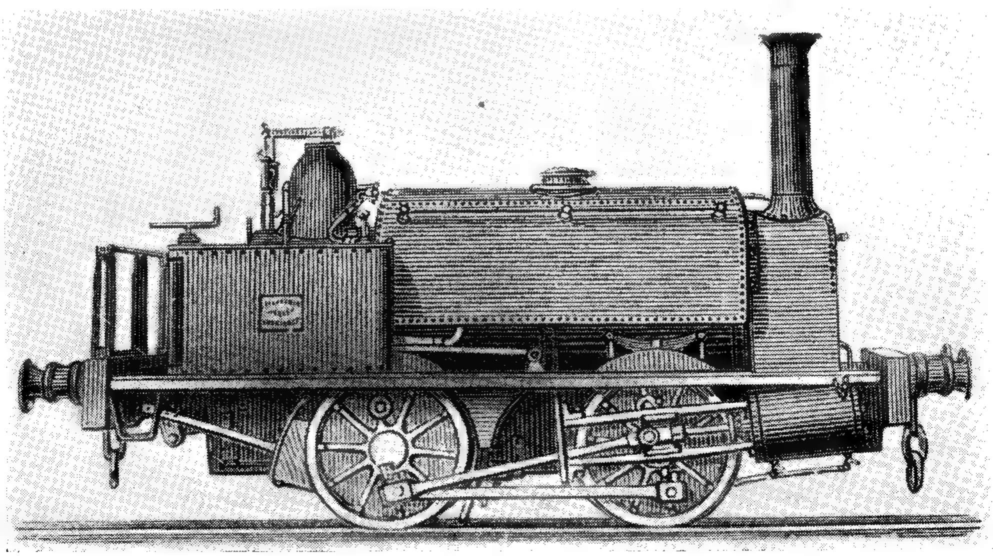
A Saddle-Tank Locomotive of 1874

by H. H. Nicholls

SOME builders of model locomotives take great interest in the saddle-tank type, as Mr. Stephens, of Liverpool, has done to such good purpose, in the model which "L.B.S.C." illustrated in his notes.

The writer came upon the engraving of a good example in the pages of the *Popular Encyclopaedia* of 1874. It shows a design which would be admirable on a public "miniature railway," having no cab to get in the way. The encyclopaedia describes it as a "tank locomotive for collieries, etc.," and certainly it has ideal features for its intended purpose; the wheels of a colliery engine would have been made somewhat larger than those of an engine intended only for shunting, as many colliery railways have a downhill run to the shipping point or "staith," and the maximum tractive effort of the locomotive is employed in bringing back the "empties" uphill, at a good speed.

The design of the crossheads could be improved; the "slippers" should extend further on the side of the pin towards the connecting-rod. The front axle is seen to have laminated springs; coil springs will be proper for the rear axle, and anyone who builds an engine of this kind to stand hard daily work would do well to make the axleboxes very wide, as there are only the four eccentrics of the valve-gear and one for the pump, to go between the frames, and there should be ample room. The dome cover ought to be "raised" in thin copper, and a chimney top made from the same material. Anyone who wanted to build this design could get the dimensions by scaling them in proportion to the distance between the rail level and the centre-line of the buffers. Observe that the boiler barrel is lagged with wooden strips, probably polished mahogany in the original, but on a practical model, the usual sheet metal finish would be better practice.



*CAMERA DESIGN

An article of great importance to every reader whose interest centres on the field of photography

by Raymond F. Stock

IT is probably true to say that any type of lens focussing mechanism, shutter, diaphragm and plate or film may be used in any combination, having regard to the most diverse requirements of photographers.

Common sense, however, usually groups the individual parts into certain combinations which appear on the market as "classes" of camera. These are naturally designed to cover certain vaguely defined types of work which experience has shown to exist.

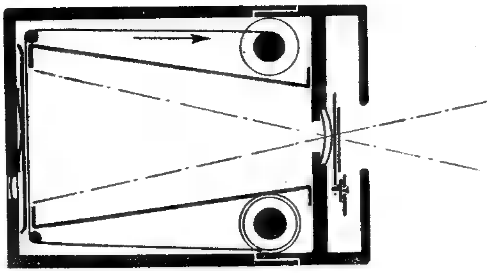


Fig. 27. Box camera

The amateur constructor, however, knows exactly what his own requirements will be (or does he?) and should be able to select the appropriate combination of features to cover them. For this reason I believe it is unwise slavishly to copy a "standard" design, particularly so, since the amateur can use techniques of construction that would place a camera company in the bankruptcy courts.

A "box" camera is generally regarded as a poor thing by photographers, but given a focussing mechanism and with a lens to suit the pocket of the maker, surely this form of construction is simple, rigid and inexpensive; moreover it might be made from almost any material, and (though seldom done commercially these days) can be made to take plates as well as films.

The layout will be well known to most modellers and is shown simply in Fig. 27.

A folding camera is attractive if minimum size is important, but few are really rigid; here again the modeller should be able to improve on factory-made jobs by using heavier section struts and hand fitting the joints.

Two or three variations on the folding system are common, and the basic geometry is shown in Fig. 28.

Wood, often used at one time, is a doubtful proposition for folding cameras, and an all metal construction is likely to be more satisfactory.

Better-class cameras of this type often have the shutter operated from the body. This is done by a folding linkage; placing the trigger on the body enables it to be interlocked with the film wind shaft, thus preventing double exposures. Similar linkage is sometimes used to transfer the movement of the lens (in focussing) to the body, on which is situated a rangefinder. The latter is a very useful "extra" if much medium range (i.e., 6-60 ft.) photography is likely to be done with moving objects.

Rangefinders may be purchased as separate units and can be coupled to any focussing camera by arranging a suitable cam or link between the focus knob and the rangefinder control. The

*Continued from page 180, "M.E.," February 7, 1952.

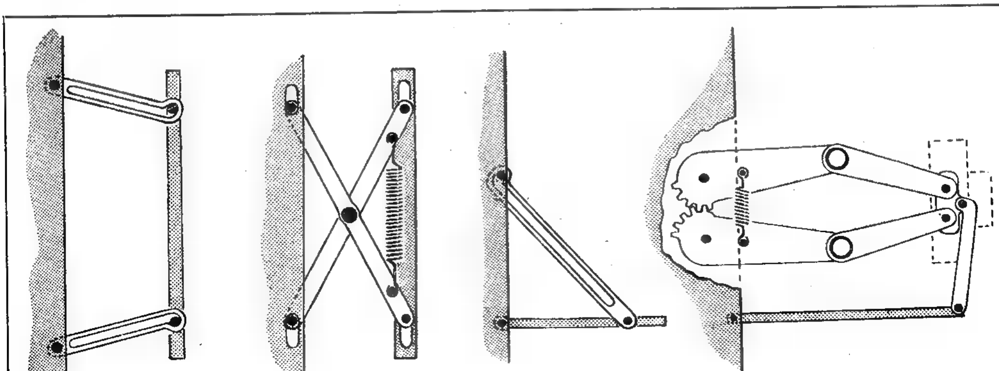


Fig. 28

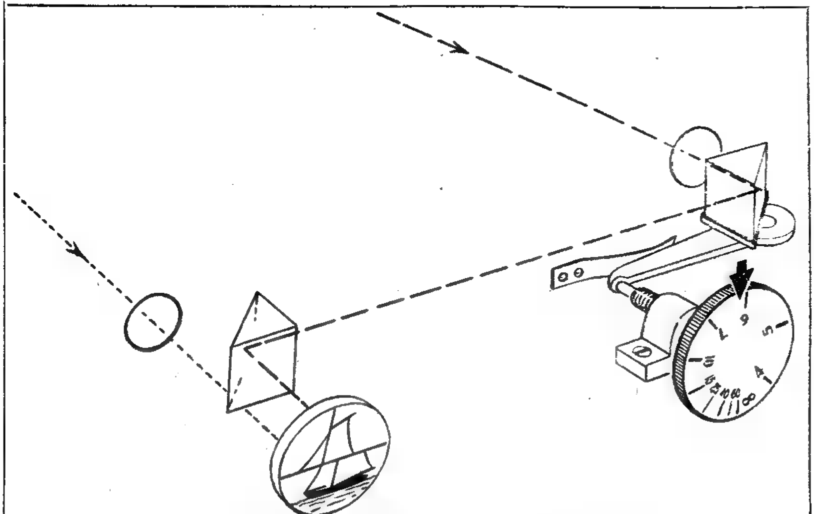


Fig. 29. Split-image rangefinder. Incorrectly set and image out of register

details must obviously be worked out for each separate case, but the easiest way, usually, is to fit a cam on the rangefinder shaft and to cause this to operate the focussing assembly. Adjustment will then consist of focussing a large number of different objects at a range of distances on to a ground glass screen in the camera, and altering the cam profile until the rangefinder agrees with the camera at each point ; rather tedious, this ! It is a good point, however, to design a camera so that a rangefinder may be fitted if required at a later date ; it is necessary merely to provide a point from which focussing movement may be "picked up."

Two types of rangefinder are sometimes met —the "split image" (Fig. 29) and, more commonly, the "superimposed image" type (Fig. 30).

Both depend on presenting in one lens a composite image from two points of view. The split image type presents one image above the other, and is useless if no strongly marked vertical lines are available (unless the camera is turned on its side). The other type superimposes one image on the other, the first image being distinguished by its colour, a yellow (usually) filter being interposed in the optical system.

In both types the idea is to register the images, which is done by rotating a prism ; the angle of rotation found necessary is a measure of the distance required, so the knob control may be calibrated accordingly.

Such apparatus is quite simple to make, requiring mechanically only one good bearing ; small prisms are difficult to get, but may sometimes be encountered in surplus equipment. Photographic rangefinders generally have a separation between viewpoints of about 2 in., but if space is available, the greater the better, since the accuracy depends directly on this factor (other things being equal).

Owing to the necessity for folding linkage between lens panel and rangefinder, a folding camera is perhaps the least suitable type in which to incorporate a coupled rangefinder ; a non-coupled type presents no difficulties, of course, and is an asset on any focussing camera.

It is in the "miniature" camera that the coupled rangefinder comes into its own, since the type of construction used, being most rigid, lends itself to the greatest precision.

The term "miniature" camera has come to indicate as much a type of camera as a size, and this is exemplified by the well-known Leica, which hardly needs description since the American occupation !

The basis of such a camera must be a really rigid body and the more ambitious amateur might be able to cast this member in light alloy.

The mechanism is complex as the specification includes focal plane shutter with a wide range of

(*Continued on page 214*)

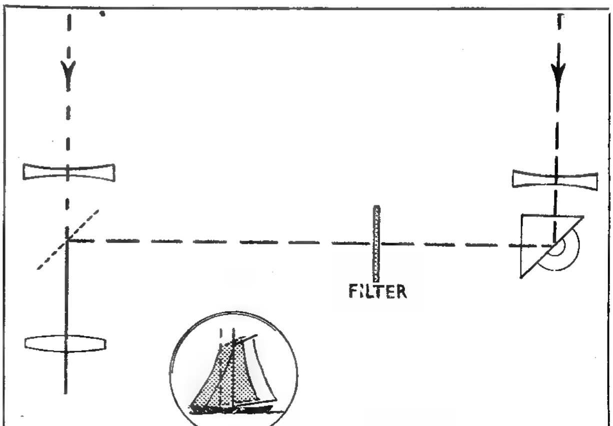


Fig. 30. Rangefinder using superimposed images. Incorrectly set and out of register

" Talking about Steam—— "

by W. J. Hughes

A series of articles intended to supply suggestions and information for the would-be " modeller in steam " who has not the time, the inclination or the opportunity for extensive research

1 : Introduction—General Construction of Traction Engines

DURING thousands of years, man has been a builder of models, and fortunately for us many of his models have been preserved to this day, though often quite by accident. Such models as have reached us have helped to give us moderns a glimpse of life through the ages, obscure as it may be in many respects.

Still, it is most unlikely that the " model engineers " of past ages ever had such an idea in mind, as they built their masterpieces. In all probability, to them as to us, building a model was just a very pleasant way of passing time and helping to forget the hurly-burly of ordinary life, in the joy of creation.

However, it is a sobering thought (yet quite feasible !) that the model you are now working on may, in the year 6952, be resting in some museum, labelled :—

> **LOCOMOTIVE OF EARLY XXth CENTURY**
>
> **Driven by steam, a method of propulsion which arose in the XIXth century, but became extinct in the XXth, owing to the advent of the Atomic Age.**

One has only to spend some time at the " M.E." Exhibition to realise not only that there are many models of today which would be worthy of such a position, but further that however soon (if ever) steam power becomes extinct in full-size practice—and may it be long reprieved—for many, many decades, there will be modellers who will still thrill to the fascination of steam, whose nostrils will quiver to its odour, and who will build replicas of their favourite steam engines for their own interest and occupation.

Such a wealth of prototypes is available ! Traction engines, portables, undertype and overtype semi-portables, stationary horizontals and verticals, compounds, majestic triple and quadruple expansion, humble singles, lordly uniflows, old-time marine engines, winding engines, railway locomotives : such a variety fairly makes the mouth water, doesn't it ?

And yet there is a big snag—where does one obtain particulars of some of these prototypes ? The more modern railway locomotives are not too difficult, and besides we have our " L.B.S.C." ; but many of the other types are disappearing rapidly, or have disappeared entirely.

So vanishing are the opportunities which once one had of observing one's prototype at work, of measuring up, of sketching, and of photographing, and gone are many of the firms whose names will long be remembered as magnificent engineers in the best British tradition. Even of the still existing firms, few of them are actively engaged in building *steam* engines—diesels, yes, but steam, no ! And so, one repeats, where *does* one obtain the drawings and other particulars ?

The answer is, of course, " in many places "—on the second-hand bookstall, in the local reference library, among other enthusiasts, and especially in back volumes of THE MODEL ENGINEER. If you forage long enough, you'll often find what you want.

However, this new series of articles is intended to supply suggestions and information for the would-be " modeller in steam " who has not the time, the inclination, or the opportunity for extensive research. When it was first considered, some time ago, it was only proposed to deal with traction engines, road locomotives, and portable engines, but the field has now been widened, with the Editor's approval, to include as wide a variety as possible of steam prototypes. For quite a lot of the material which I shall use, I am indebted to many MODEL ENGINEER readers who have written me on the subject and lent catalogues and other literature ; in addition, I shall borrow from many old books which I am fortunate enough to possess, or which I have been loaned by friends or borrowed through the local library.

But now, before I get down to business, let me be quite clear on one point. I do *not* claim to be an " expert " on the subject of steam engines—in fact, there must be many readers who would be better qualified to write these articles than myself. But as they haven't done so, I hope that they will be tolerant of my own efforts, which may contain gaps which they can fill. If so, I hope they will not hesitate to write to me ; my own desire is but to add to the general knowledge, and perhaps to help to correlate it.

Such readers are also asked to be tolerant if some of the material appears to them to be somewhat elementary, and to remember that *all* knowledge is new to somebody. The tyro may well be glad to learn facts which the expert has known for thirty or forty years, and one has to try to strike a reasonable balance.

So to get down to brass tacks, here are some

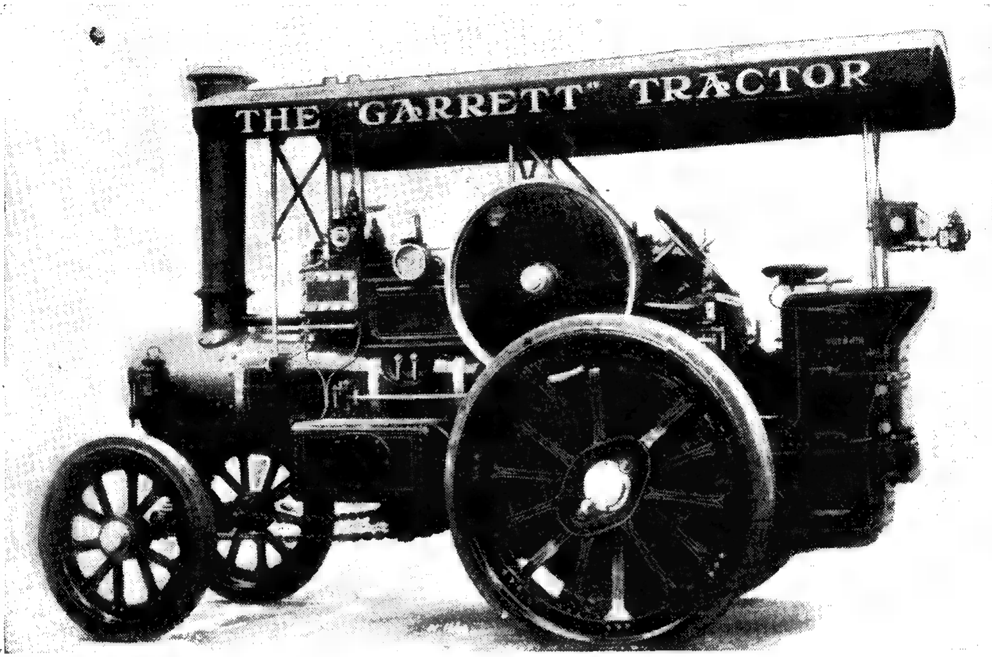


Photo by courtesy] [*R. G. Pratt*
Photograph No. 1. The Garrett light tractor, designed primarily for road haulage. Because of this, both axles were sprung, and a belly-tank was fitted to give increased range

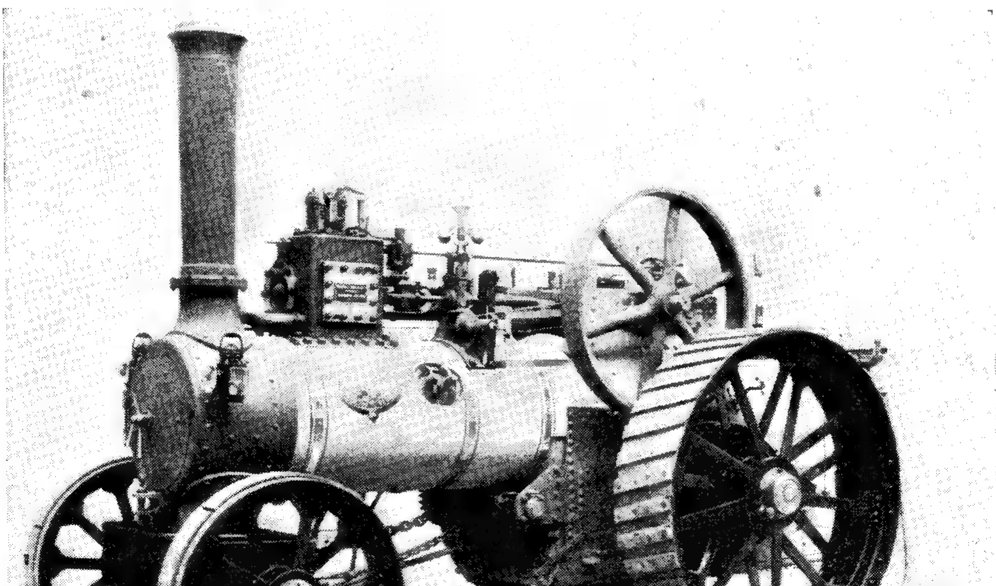


Photo by courtesy] [*J. P. Mullett*
Photograph No. 2. An "official" photograph of Marshall No. 73930, typical of the general-purpose traction engine. Note track-guide, cross-arm governor, cut-away spectacle plate, and dished flywheel spokes

notes on the general construction of traction engine prototypes, which will be further continued in the next article.

General Notes on "Traction Engines"

There are three main types of self-propelled steam vehicle which to the layman are all "traction engines," though each possesses its own characteristics. The first type is the steam tractor, most examples of which weighed less than five tons empty, to meet the restrictions of the Motor-Car Act of 1905.

Photograph No. 1 shows a typical example. There are still a few left in regular use, and they can be recognised by the comparatively small dimensions. The hind wheels were from 4 ft. 6 in. to 5 ft. 3 in. in diameter, and flywheel from 2 ft. 6 in. to 3 ft. in diameter. Compound cylinders were almost universal, with $4\frac{1}{2}$ in. and $7\frac{1}{2}$ in. bore by 9 in. stroke as typical dimensions, developing about 20 b.h.p. at a working pressure of 180 to 200 p.s.i. The wheels were often shod with rubber, and both axles were usually on springs.

These engines were designed for road-haulage, and users included brewers, timber merchants, furniture removers, and showmen, as well as haulage contractors.

We should note here, by the way, that Fowlers and one or two other firms used the term "road tractor" at times to describe *all* their road-haulage vehicles (except agricultural engines), including the heaviest road locomotives weighing up to $17\frac{1}{2}$ tons—just another example of the confusion which exists to trap the enquiring tyro! Still, in general, the term can be understood to mean the light tractor of under 5 tons.

Traction Engines

The traction engine, often termed agricultural engine in catalogues, was a heavier machine, with a weight empty of from [illegible] to 11 tons, according to horse-power. This was usually quoted at so many n.h.p. (nominal horse-power), which on the average was about one-sixth of the i.h.p., or indicated horse-power. The n.h.p. was from 5 to 10, with cylinders of $7\frac{1}{2}$ to 10 in. bore by 10 to 12 in. stroke, with working-pressure for single-cylinder machines up to 150 p.s.i. Rear wheels were from 5 ft. 6 in. to 6 ft. 6 in. diameter, with flywheels of 4 to 5 ft.

The majority of general-purpose traction engines were singles, but most makers also built compounds, with working-pressures up to 200 p.s.i., and cylinders for 6 n.h.p. of $5\frac{3}{4}$ in. and 9 in. bore by 10 in. stroke, or for 8 n.h.p. of $6\frac{1}{2}$ in. and 10 in. by 12 in. stroke. Flywheels were spoked, and dipped below the rim of the hind wheel.

These engines were frequently unsprung, and fitted with two speeds only. Their chief use was for driving agricultural machinery, and in hauling it from place to place, but not for general haulage. Photograph No. 2 shows a typical example of the class.

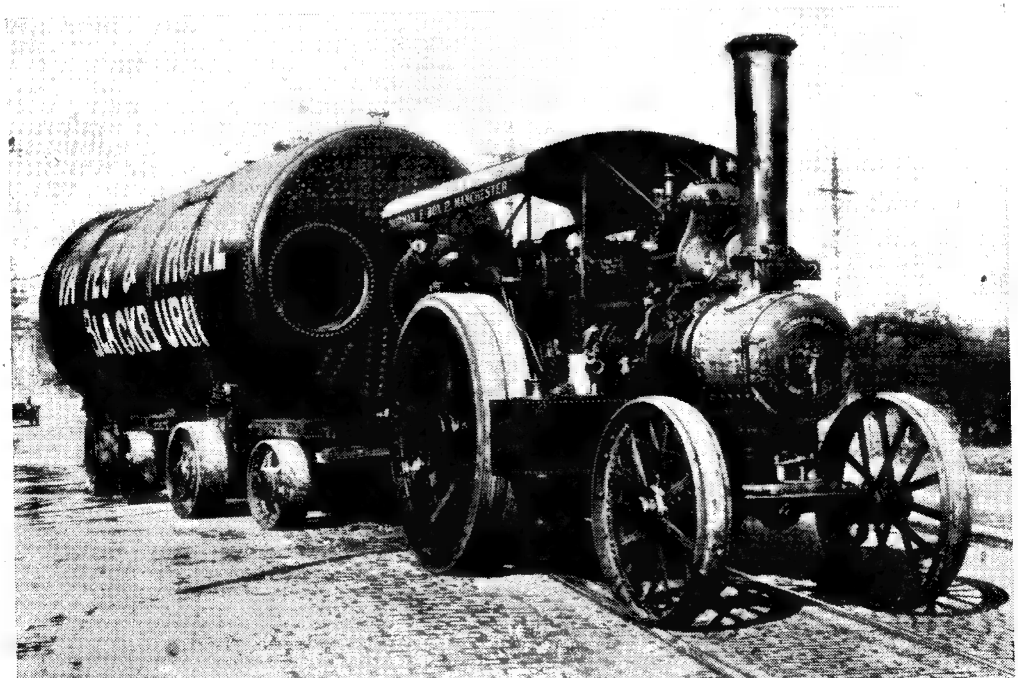


Photo by courtesy] [John Fowler & Co. (Leeds) Ltd.

Photograph No. 3. A fine example of the road locomotive class: a Fowler "Big Lion" hauling a typical load. This particular engine was subsequently rubber-shod on the front wheels also

Road Locomotives

The cover picture and Photograph No. 3 show the Fowler "Big Lion" road locomotive, one of the most powerful of this class, and a firm favourite with many haulage experts.

Road locomotives were built more robustly for continuous haulage by (to quote a catalogue) "contractors, mine-owners, manufacturers, and boiler-makers"; nor must we forget our friends the showmen, for whom many of the best examples were built. The gearing was of stronger pitch and wider face, shafts were of larger diameter, and both axles were sprung. Hind wheels were larger in diameter (6 ft. 3 in. to 7 ft.) and wider on face; rubber tyres were often fitted to all the wheels.

Fore tanks (or "belly" tanks) were usual, to give greater range, and most road locomotives were compounds for greater economy. Flywheels were of the disc type, and the motion work was enclosed by side-plates, which features the older catalogues eulogise because they "avoid frightening horses." It seems rather illogical, though, that the *agricultural engines* should have open motion and spoked flywheels, but presumably farm horses were of a more phlegmatic nature than those met with on the roads!

Constructional Details

In the early days of the traction engine, there were very many designs which appeared vastly different from others, according to the ideas of their builders, and I shall illustrate some of these in future articles. However, after about 1890, the general construction and appearance of most makes of traction engine became quite similar, following that classic designer William Fletcher. At the same time, of course, individual designers had their own ideas as to *details*, and it is partly these which render the study of the traction-engine so fascinating.

The basic design of the "chassis," so to speak, is shown in Photograph No. 4, which is reproduced by kind permission of Messrs. Davey, Paxman and Co., Ltd., of Colchester. The boiler is of the locomotive type, but the side-plates of the firebox are extended upwards and backwards to carry the bearings for the crank-shaft, intermediate shaft or shafts, and hind-axle; this construction is based on the invention of Thomas Aveling in 1870, and the plates are known as "hornplates."

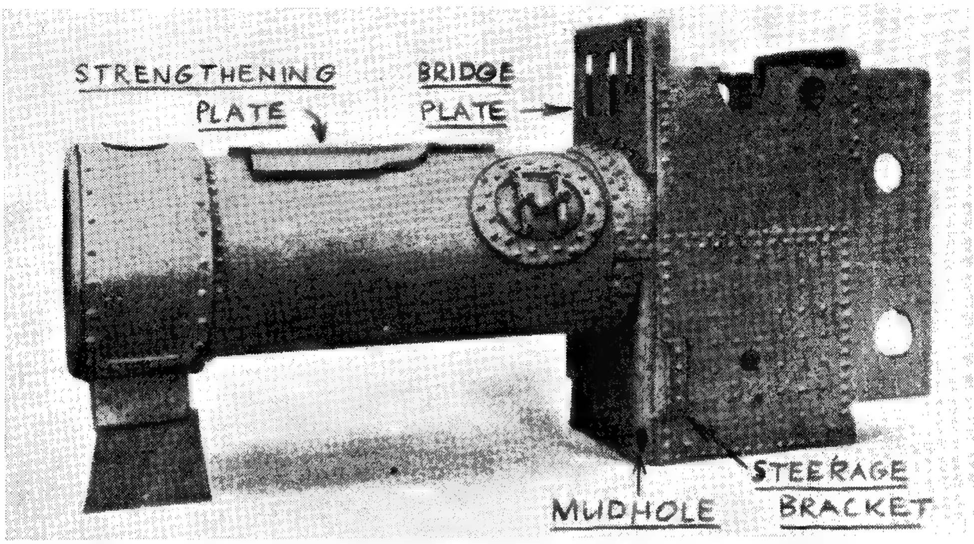


Photo by courtesy] [Davey, Paxman & Co. Ltd.

Photograph No. 4. An orthodox example of boiler construction, with the firebox side-plates extended to form the hornplates

The top of the firebox, or arch-plate, is riveted to each hornplate at the side, with a strip of thinner material (usually wrought-iron) sandwiched between to allow for caulking the joint (Fig. 1). The hornplates are strengthened by means of two transverse plates, known as the bridge plate or spectacle plate and the frontplate respectively, giving a rigid box formation. In many makes, as in the Paxman illustrated, these transverse plates are flanged for extra strength, and the flanges riveted to the hornplates; in other makes the fixing was by angles riveted to both. The "front" plate, incidentally, is that at the *back* of the engine, dating back to the days of portable engines, when what loco-people call the "backhead" of the boiler was the boiler-front. (Similarly, the "back" of the cylinder of a traction engine is that nearest to the chimney, and the "front" that nearest to the driver—just another thing to tie up the tyro!)

In a model, where the boiler is to be built of copper, this metal is obviously unsuitable for the hornplates, owing to its ductility, and the difficulty is usually overcome by building the boiler in the normal way, and then fixing on separate

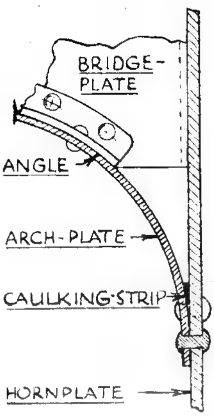


Fig. 1

steel hornplates in various ways. One of these is to extend some of the side-stays of the firebox, and to bolt the plates to these; but when I describe the construction of the boiler for the Allchin "M.E." traction engine, I shall give [redacted] different method which should not only prove more rigid, but which will also give the correct appearance.

Reverting to the spectacle-plate, this may be pierced to clear the connecting-rod, eccentric-rods, and governor belt, as in the Paxman, but sometimes almost the whole centre is cut away for this purpose. Notice that this plate is further riveted to [redacted] curved angle riveted to the arch-plate.

In the side of the boiler is a manhole for cleaning purposes (the position of this varied with different makes), and on the top is riveted a piece of thick plate to reinforce the boiler where cylinder and motion plate fit. Low down near the foundation ring are seen mudholes through which the sediment is washed in boiler cleaning.

The angle-brackets just above these [redacted] to take the steering-gear—usually termed steerage, by the bye—but where [redacted] belly-tank is fitted, these brackets help to support the tank, and the steerage brackets [redacted] fixed either to the front or underneath of the tank itself.

In conclusion, I have not gone into too great detail, but those readers avid for more should consult my book *Traction Engines Worth Modelling*. It may also be mentioned for the benefit of newer readers that blueprints of the general arrangements of several different engines are obtainable from THE MODEL ENGINEER offices, from which [redacted] complete list may be obtained. This list will be added to as time permits.

(*To be continued*)

CAMERA DESIGN

(*Continued from page* 209)

speeds interconnected with the film transport mechanism, [redacted] coupled and efficient rangefinder and an enormous range of accessories which make the camera most versatile. A full description of the mechanism would be out of place in this article, but I believe that given [redacted] accurate lathe and [redacted] aptitude for modelling on [redacted] watch-making scale such [redacted] type of camera is practicable. I would suggest that a good way to start would be to purchase the Leica manual which gives many details of the construction of the camera, and to base design on this.

Reflex cameras are deservedly popular and may be used with from 35 mm. film to half-plates. A true reflex—single lens—is illustrated in principle in Fig. 31. A hinged mirror M is normally in place at 45 deg. behind the lens, and produces an image on a ground glass screen G in the top of the body. This image, in every respect identical with the resulting photograph except for left to right reversal, is seen up to the moment of exposure when the mirror is quickly hinged upwards to [redacted] horizontal position. Here it seals off light which would otherwise enter through the screen, and trips the focal plane shutter S which makes the exposure. The image on the screen may be used for view-finding and focussing, though it suffers from one defect—if the lens is used at [redacted] small aperture viewing may be difficult. On the other hand, depth of focus may be seen directly.

The mirror in [redacted] reflex camera is generally surface silvered, and in its downward position may be used to mask the exposing blind during rewind thus dispensing with [redacted] capping blind.

(*To be continued*)

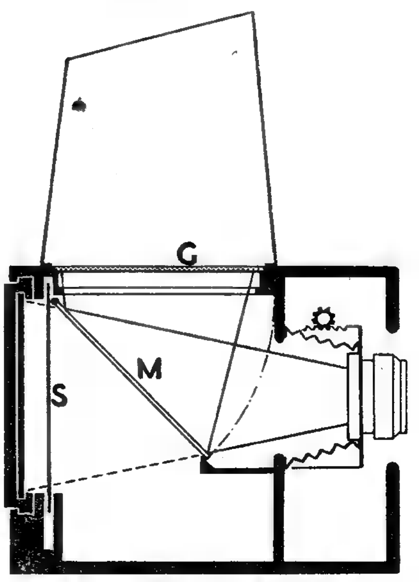


Fig. 31. *Single lens reflex. Note folding leather hood around screen*

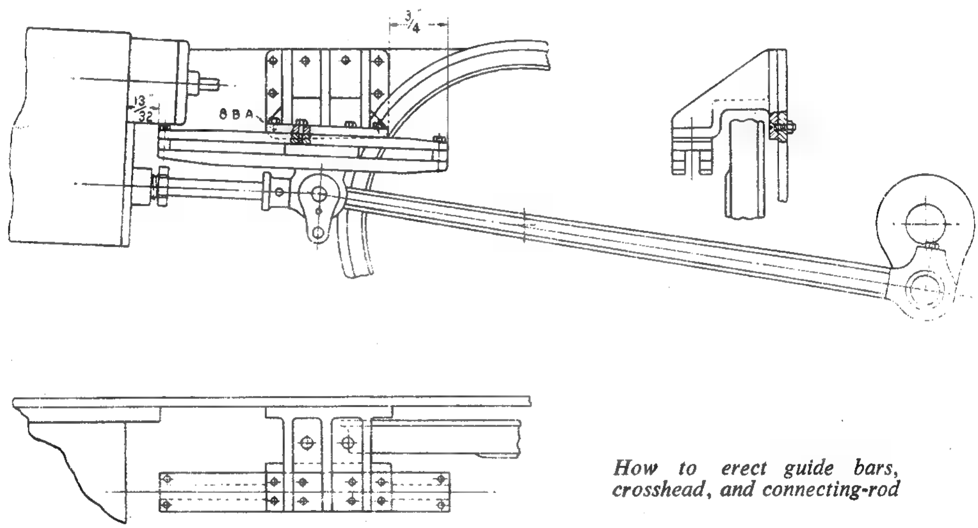
"Britannia" in $3\frac{1}{2}$-in. Gauge

by "L.B.S.C."

Details of the Motion Work

NOW we come to the motion work; and here, I anticipate some awful moans from the relations and followers of Inspector Meticulous, because certain components will differ a little in shape and proportionate size, from those on the full-sized engine. For new readers' benefit I might repeat that this is to ensure an efficient, reliable and hard-working engine; an exact reduced copy of a full-sized one would look pretty in a glass case in the Science Museum, but it would be useless on the road—a statement made by a well-known C.M.E. in my own workshop, when favourably commenting on my version of one of his own full-size designs—and *he* should know, above all people! Well, to get to business, the guide-bar brackets for little *Britannia* differ from those of her full-sized sisters by having no platform for carrying a mechanical lubricator. One of the latter made to one-sixteenth of full size, would be hopelessly inadequate even if you could put an efficient pump, capable of dealing with "full-size" superheater oil, in a box about as big as a lump of sugar, three-lumps-to-a-cup size. Our engine will have a "20-gallon" edition between the frames at the leading end. Otherwise, the brackets bear a family likeness to those on the big engine.

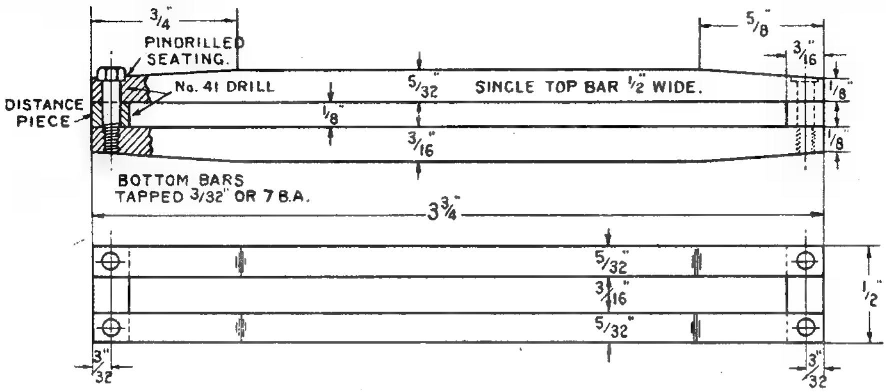
Castings should be available by the time these notes appear; and although the brackets could be built up, it would be a ticklish job to get them O.K., whereas the castings should only need machining on the bolting flange, and the part to which the guide-bars are attached. As these machined faces are at right-angles when seen end-on, the attachment part could be smoothed roughly with a file, and clipped down to an angle-plate with the bolting flange just overhanging the edge; a toolmaker's clamp at each end would do the trick. The angle-plate could then be bolted to the faceplate, and the bolting flange machined off with a round-nose tool set crosswise in the rest. Care must, of course, be taken to clamp the bracket so that the bolting flange is square with the lathe bed, and parallel to the faceplate; readers who followed the detailed instructions for *Tich*, won't have any difficulty in doing that little job! The guide-bar seating can be machined off in the same way, by clamping the machined bolting flange to the angle-plate, with the seating overhanging the edge; but here, you'll have to watch your step, as the two faces, although at right-angles when viewed end-on, are not line-and-line when seen from the front. The leading end of the guide-bar seating is $\frac{1}{16}$ in. higher than the rear end; so when clamping the bolting-face down to the angle-plate, set it slightly askew, sufficient to allow the seating to come square with the lathe centre line. Be careful when feeding into cut, as the part to be machined, is well away from lathe centre, and the cut is intermittent. Too much feed at a time, will either knock off the tool edge, or damage the casting.



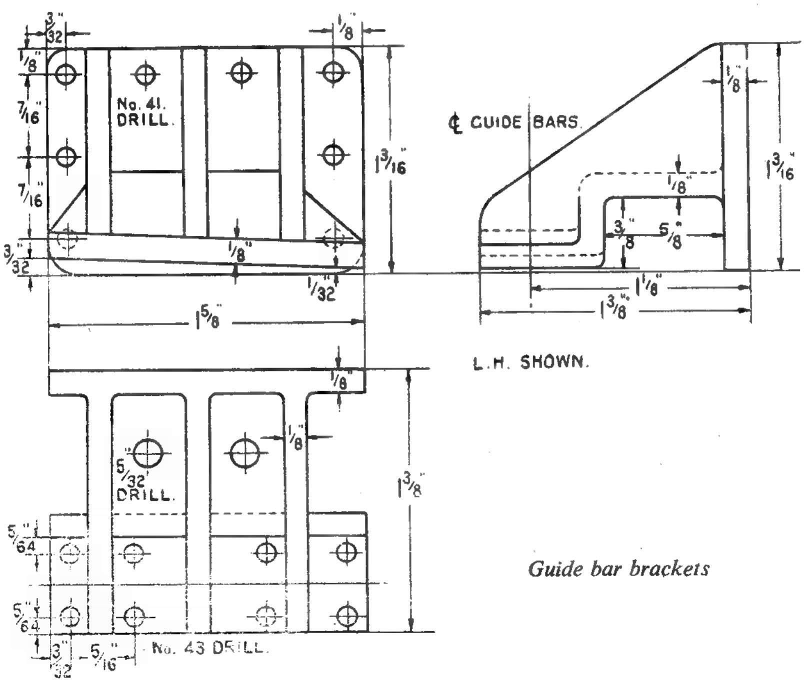
How to erect guide bars, crosshead, and connecting-rod

Anybody who has a vertical slide, can reverse the above process by bolting [redacted] angle-plate to it, mounting the casting on the angle-plate, and traversing it across [redacted] end-mill or slot drill held in the three-jaw. Same caution about setting to correct angle, applies here. A mill not less than $\frac{5}{8}$ in. diameter should be used, so as to do the guide-bar seating in one traverse. Lucky owners applied with common-sense and discretion, will smooth off both faces quite satisfactorily.

The holes in the bolting flange are marked off and drilled from the back. The two bottom ones should be countersunk, to take [redacted] flush screw, in order to clear the wheel backs ; see assembly drawings. For countersinking holes that you can't get at in the ordinary way, I use two methods ;



Guide bars



Guide bar brackets

of milling machines have nothing to worry about ; just grip the job in the machine vice on the miller table, and run it under [redacted] small slabbing cutter on the arbor. The one I bought for a shilling at Buck & Ryan's, after the Kaiser's war, is still going strong ! If you haven't facilities for machining, don't fret ; for the humble but useful file, either [redacted] short bit of drill used ratchet-brace fashion, or [redacted] stub end of drill soldered into the end of [redacted] spiral spring. Both ways are " all wrong," *that* goes without saying ; but it is mighty funny how my outrageous methods usually do the trick ! The holes in the guide-bar seating need [redacted] comment, but the two 5/32-in. holes in the

webs between the ribs are put there just because the big engine has similar holes in the webs. I'm writing this in the early days of January; did I hear Inspector Meticulous wishing me a Happy New Year? The brackets are not erected until the whole issue is ready for assembly.

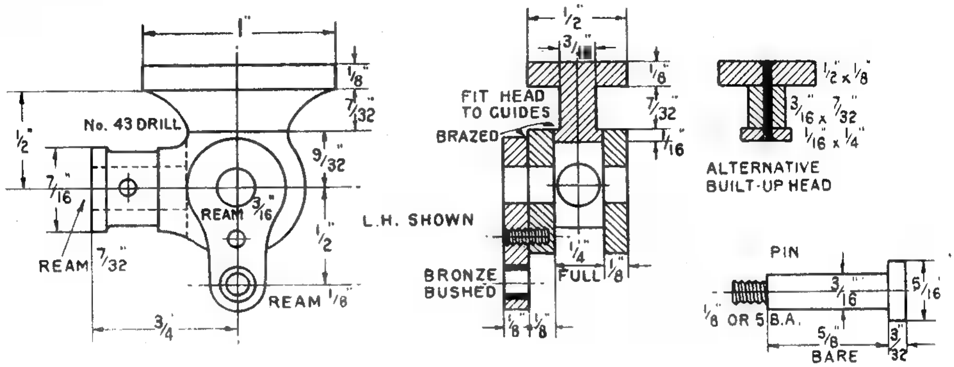
Guide-bars

These are of the "three-piece" type. The top one is a comparatively "Bill Massive" slab of mild-steel, or silver-steel, $\frac{1}{2}$ in. wide, 5/32 in. thick and $3\frac{3}{8}$ in. long. As the top bar does all the guiding when the engine runs chimney first, this gives ample bearing surface, but I would never use this arrangement on a tank engine, which has to work equally hard either way. You'll maybe have noticed that B.R. standard tanks have the usual top-and-bottom bars with alligator crossheads.

The bottom bars are of 5/32 in. $\times$ $\frac{3}{16}$ in. section. All three bars are tapered down by filing or milling, to a thickness of $\frac{1}{8}$ in. at each end, the lengths of the tapers being shown in the illustration. Note: drill the holes from the *flat* side of the bars, then make a very shallow pin-drilled recess at each hole in the tapered side of the top bar. On the big engine, all the holes are pin-drilled, and flat-headed bolts are used, with nuts on top; but on the little engine, the arrangement shown is not only easier, but makes a stronger job. The holes in the top bar, and in the $\frac{1}{2}$ in. $\times$ $\frac{3}{16}$ in. $\times$ $\frac{1}{8}$ in. mild-steel distance pieces are drilled No. 41. The holes in the bottom bars, are drilled No. 48 and tapped 3/32 in. or 7 B.A. The bolts can be made from 3/32-in. silver-steel, the heads being ordinary nuts screwed on, and the threads slightly riveted over; these are exceedingly strong, and far better than ordinary turned screws.

Crossheads

The crossheads call for a bit of jerrywangling. It's a piece of cake for Crewe, Swindon, Derby & Co. with their drop-forging equipment and machining facilities, to knock out three-bar crossheads in galore, but not so handy for the poor backroom or garden-shed boys to follow suit! But are we downhearted? They can both be built up, using steel bar of $\frac{1}{2}$ in. $\times$ $\frac{3}{4}$ in. section for the crosshead proper, and $\frac{1}{2}$ in. $\times$ $\frac{7}{16}$ in., or $\frac{1}{2}$ in. square, for the slipper. A piece of the former size about $2\frac{1}{2}$ in. long, will make both crossheads. Chuck truly in four-jaw, and face the end. Turn the boss to the dimensions shown; centre, and drill to about $\frac{5}{8}$ in. depth with No. 4 drill. Reverse in chuck, slacking jaws 1 and 2, and tightening same after reversal; the piece should then run truly. Repeat operations, then saw or part into two, facing off the end of each one until the length is approximately $1\frac{1}{8}$ in.



Crosshead, pin and drop arm

Next, clamp each one under the slide-rest tool holder, packing up until the centre of the piece is level with lathe centres, the blank end of it facing the headstock. Put a $\frac{1}{4}$-in. end-mill or slot drill in the chuck—I much prefer home-made slot drills with just the two cutting edges, for jobs like this; they cut easily and fast—and traverse the crosshead blank across it with the cross-slide, feeding into cut with the top-slide, Don't take too heavy a cut at each traverse, run the lathe at a good speed, and slop on plenty of cutting oil; and before many minutes are past, you'll have the crosshead nicely slotted to $\frac{5}{8}$ in. depth, as shown by the vertical dotted line in the side view. The sides of the slotted portion can then be filed to the shape shown.

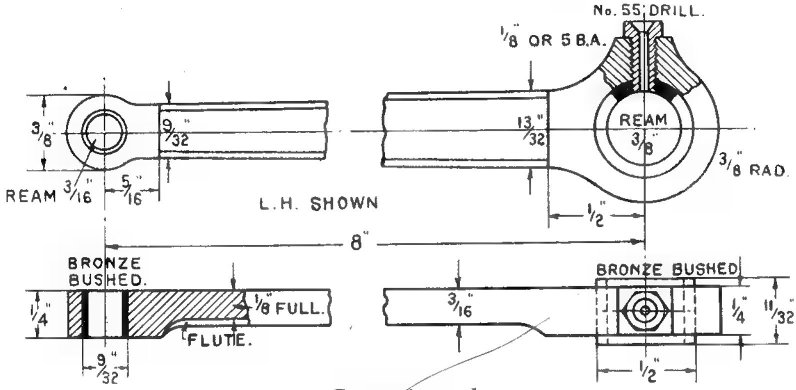
Now for the slipper or shoe; different from Cinderella's, but easier to make and fit. It can be cut out entirely from the solid, with an end-mill or slot drill, or it may be built up. In the former case, set up the piece of bar (size given above) which should be a little over 2 in. long, exactly the same as I have repeatedly described for milling axlebox grooves. Put a 7/32-in. end-mill or slot drill in the three-jaw, and mill out a groove 5/32 in. full depth on each side. Now turn the piece over on its side, and mill away the bottom part until it is $\frac{1}{16}$ in. thick; the piece will now look like a weeny girder with $\frac{1}{8}$ in. flange at the top, $\frac{1}{16}$ in. at the bottom, and a $\frac{3}{16}$ in. bare web between. Clamp it again under the tool-holder, leaving the narrow edge projecting a little, and mill away $\frac{1}{8}$ in. of the narrow flange at each side, so that the remaining $\frac{1}{4}$ in. will fit tightly into the groove in the crosshead; see sectional illustration. Saw the piece in half, trim with a file to 1 in. lengths, and file away the web and bottom flange at each end, to the shape shown in the side view. Fit one to each crosshead, the result should look like the side view shown.

The full-sized engines have ■ straight drop arm, which fits between two ribs made integral with the crosshead, and held in place with the crosshead pin. There are several reasons why that won't be suitable for the small sister, and I have substituted a simpler and easier arrangement. Cut a pear-shaped drop arm from $\frac{1}{8}$ in. $\times$ $\frac{1}{2}$ in. mild-steel bar, to the shape shown; drill the holes with No. 30 drill. At the same time (says Pat) drill the crosshead itself, same size.

steel, the bearing part being left in its natural state, which is extraordinarily resistant to wear. The head is formed by reducing the end to $\frac{1}{8}$ in. diameter, screwing it, and fitting a small head, either hexagon or button; doesn't matter ■ bean which pattern. Dimensions are given in the drawing.

Connecting-rods

As the connecting-rods are made by exactly



Connecting-rod

Put ■ temporary $\frac{1}{8}$-in. bolt through the lot, adjusting the drop arm until it is at right-angles to the boss, as shown in side view. Just below the temporary bolt, drill a No. 48 hole, tap 3/32 in. or 7 B.A., and screw in a steel stud, as shown, through drop arm and side of crosshead. This will hold the drop arm in place whilst being brazed. Remove temporary bolt, and braze up the lot at one heat; just put some wet flux (Boron compo or similar) around the joints, blow to bright red, and touch with soft brass wire, which will melt and flow in. Be sparing with it, to ensure neat joints. I use my old pal Sifbronze for these jobs, and it makes swell joints. Quench in water only; clean up, open out the hole for the crosshead pin with No. 14 drill, and put a $\frac{3}{16}$-in. parallel reamer through the lot. Open out the bottom hole to $\frac{3}{16}$ in., squeeze in a bronze bush, and ream that $\frac{1}{8}$ in. Poke ■ 7/32-in. reamer through the boss, and Robert is your avuncular relation, as far as the crossheads are concerned.

Alternative Slipper

A built-up type of slipper which needs no milling, is shown for those builders who prefer fabricated components (says the third programme). The slipper itself is made from a piece of $\frac{1}{2}$ in. $\times$ $\frac{1}{8}$ in. mild-steel bar 1 in. long. The web is made from ■ piece of $\frac{3}{16}$ in. $\times$ 7/32 in. section filed to shape, and the bottom flange from $\frac{1}{16}$ in. $\times$ $\frac{1}{4}$ in. The three pieces are held together by ■ couple of long $\frac{1}{16}$-in. rivets (pieces of wire riveted over at each end) and the slipper is fitted to the crosshead as described above, the whole issue being brazed up at the one heating.

The crosshead pin is ■ very simple job, turned from $\frac{5}{16}$ in. round mild-steel held in the chuck. It would be an advantage to case-harden it. Alternatively, it can be made from $\frac{3}{16}$-in. silver-

the same process as described for the coupling-rods, there is no need to repeat the whole ritual. They are cut from $\frac{7}{8}$ in. $\times$ $\frac{1}{4}$ in. mild-steel—no need to bother about "rustless" on Curly engines! Anybody who has no facilities for milling, or otherwise cutting from bar material, can use the Reevesco malleable castings, which only need cleaning up and bushing. There is one refinement to the big-end bush. It projects an equal amount, each side of the big-end boss, and is furnished with ■ $\frac{1}{8}$-in. or 6-B.A. set-screw, which is drilled to form an oil duct, as shown in the part section. A taper flute is shown, but tapering isn't essential; if the flute is parallel, it isn't noticeable, and I make my own parallel.

How to Erect

Simple job, this! Couple up the little-end to the crosshead, and put in place, big-end on crankpin, and boss of crosshead over piston-rod. Adjust latter in crosshead boss to give equal piston clearance at each end of cylinder, as fully described for *Tich*, and pin boss to rod with a 3/32-in. silver-steel pin driven through ■ No. 43 hole drilled through the lot. Attach guide-bar bracket to top bar by eight 8-B.A. hexagon-head screws as shown, put through the clearing holes in the bracket, into tapped holes in the bar. Place over crosshead, and attach bottom bars and distance pieces. Clamp bracket to frame temporarily with toolmaker's cramp; turn wheels, and see if the crosshead slides easily between the bars, adjusting bracket if necessary. When O.K., drill No. 41 holes through frame, using those in bracket as guide, and secure with 3/32-in. or 7-B.A. bolts, using two countersunk screws in bottom holes as shown. File ■ slight clearance for wheel flange, if found necessary, in edge of bracket.

Novices' Corner

Aids to Vice Work

THE ordinary bench vice with jaws of, say, 4 in. in width is rather clumsy for holding small work, and where the vice is mounted at the customary height, that is to say with the jaws at the level of the point of the elbow, the position, although correct for heavy filing, is too low for fine work. These difficulties can be overcome by mounting ■ second and smaller vice in the main vice, so that not only is ■ more delicate grip obtained, but the work is brought nearer to eye-level and less stooping is then required. Furthermore, the bench vice may not have a swivelling base, which is so essential at times to enable the file to be correctly applied to the work, but this lack of movement will be made good if the secondary vice is itself made to swivel. Again, the utility of the small vice will be further enhanced if it has a base that allows of universal movement. The Offen universal vice, which has jaws $1\frac{3}{8}$ in. in width, is shown in Fig. 1 mounted in a 4-in. bench vice. This small vice is very accurately made and gives a secure grip when the vice head is set in any position.

Useful Clamping-Pieces

The method adopted for mounting this vice in the bench vice is to make use of two of the holes already drilled in the base, so that two clamping-pieces can be attached with $\frac{5}{16}$ in. dia. B.S.F. bolts. These clamping-pieces are made from 1 in. dia. round mild-steel, and are 1 in. in length with ■ clearance hole for the bolt drilled axially.

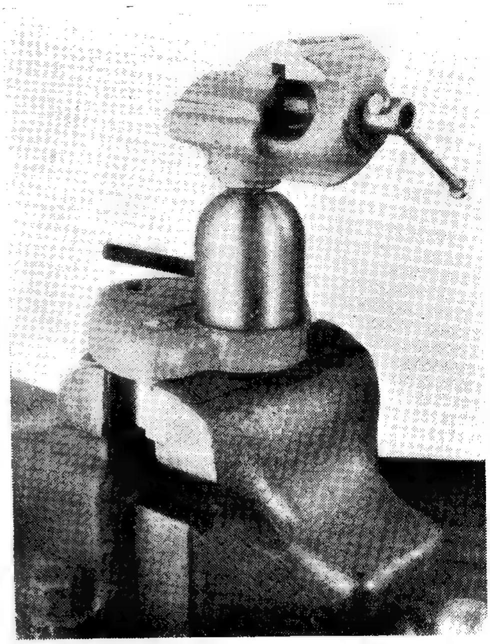


Fig. 1. The Offen universal vice mounted in the bench vice

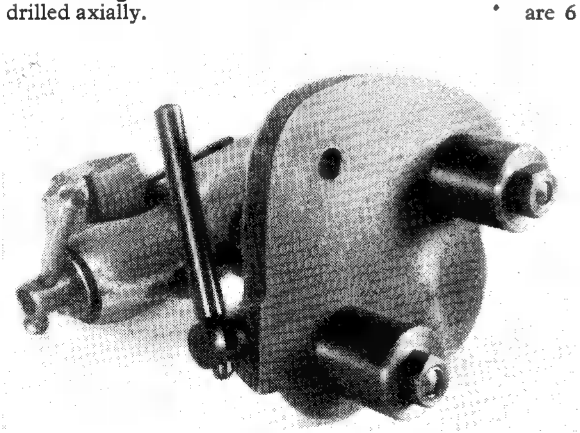


Fig. 2. Underside of the Offen vice, showing position of the clamping-pieces

Recently, when cutting out a number of frames in thin sheet metal and also when sawing some $\frac{1}{8}$ in. mahogany into strips, it was found that the ordinary vice jaws did not give sufficient support for easy working, and there was always the danger of either bending or splitting the material. To obtain additional support, it is customary to clamp the material between two heavy metal strips, but setting up the work in the vice in this way is often awkward and time-wasting, and trouble will be saved if a vice with wide jaws can be used instead. The Record woodworking vice will serve this purpose well and, as the jaws are 6 in. in width, the work is rigidly held and there is no need to keep on changing the position of the material in the jaws. It is, however, difficult to understand why the corners of the jaws were rounded off, as this reduces from 6 in. to 5 in. the effective grip at the top of the jaws, where, in fact, it is usually most needed.

To mount the vice, ■ length of 1 in. square mild-steel is gripped in the bench vice and the woodworking vice is then clamped to the free end. In this way, as shown in the illustrations, the vice can be mounted in either the horizontal or the vertical position in accordance with the direction of the saw cut required.

If a piece of steel bar is not available, ■ length of hard wood, say, 2 in. square or 1 in. × 2 in. will serve for most purposes.

Metal Shearing in the Vice

Better control can usually be obtained if, as shown in Fig. 6, one handle of the

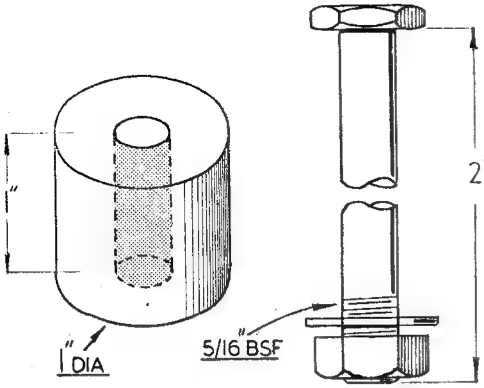


Fig. 3. Details of the base clamping-pieces

metal shears is gripped in the vice instead of holding the tool in the hand alone.

When the shears are mounted in this way, a further advantage gained is that a length of steel tube can be fitted to the upper handle, in order to obtain greater leverage and so ease the work of cutting thick sheet material ; it must be borne in mind, however, that this additional leverage will increase the strain on the fulcrum, which is here the joint pin of the blades.

Where the bench space is limited, the bench shears will probably not be kept permanently mounted on the bench and, to save time in fixing the shears, the tool, when required, can quite well be held in the vice for all but the heaviest work. An easy way of mounting the shears in the vice is to attach a clamping block to the base of the tool, as shown in Fig. 8. This block must be firmly bolted in place, and can be set either across or along the line of the base to enable the shears to be mounted in the most convenient working position.

Where the sheet material is wide and projects beyond the end of the jaws, there may be difficulty in aligning the guide line scribed on the work with the edge of the lower jaw, and if the cut is started out of line it cannot easily be corrected without

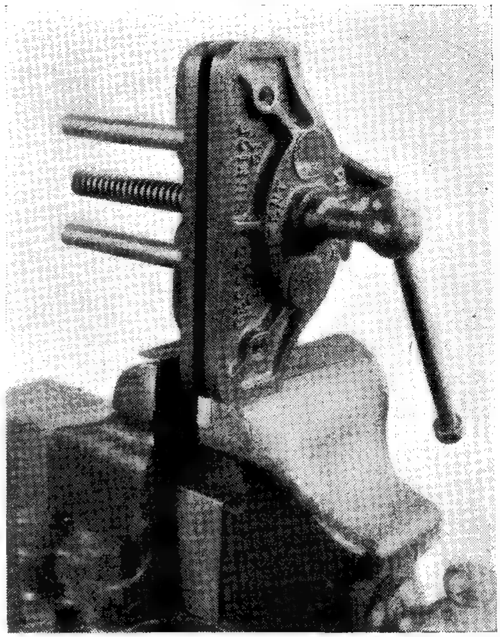


Fig. 5. The Record vice mounted vertically

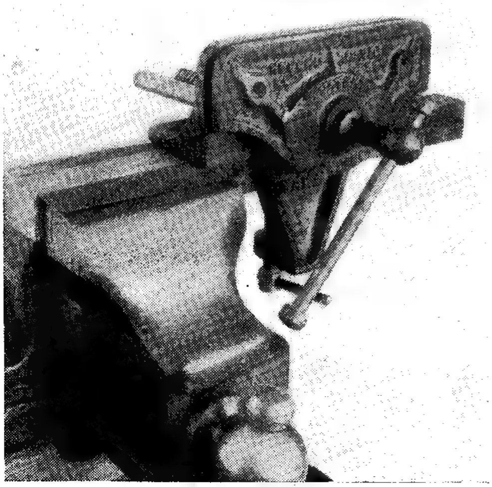


Fig. 4. Method of mounting woodworking vice in the bench vice

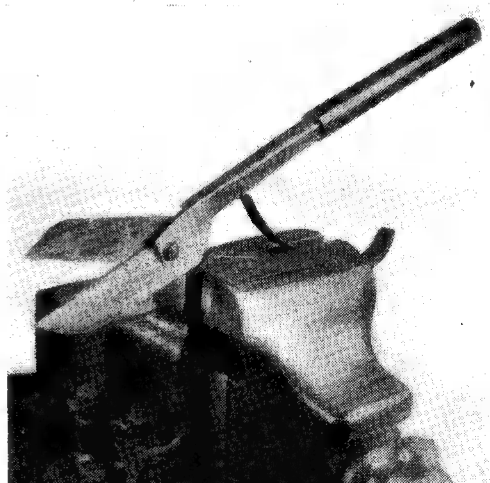


Fig. 6. The hand shears held in the bench vice

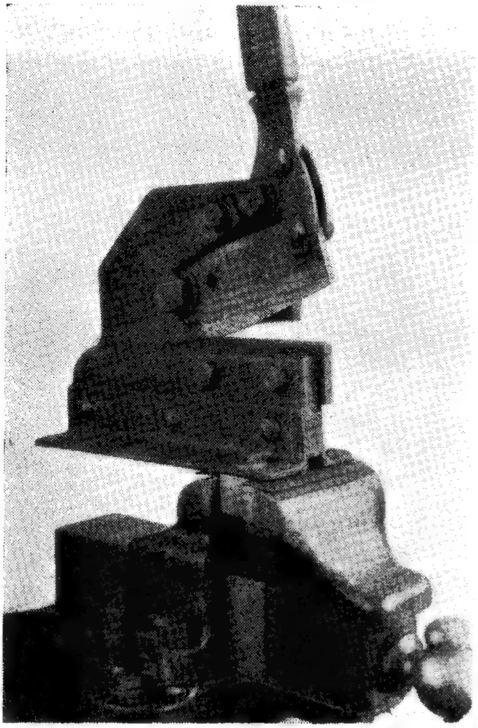


Fig. 7. The bench shears mounted in the vice

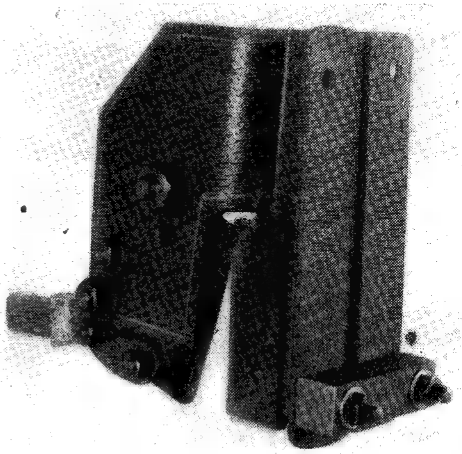
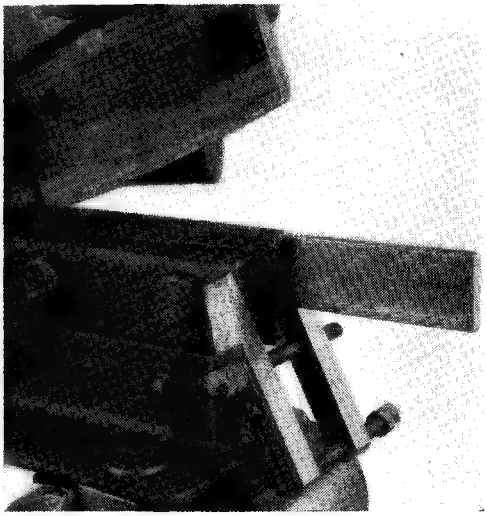


Fig. 8. Showing the base of the bench shears with clamping bar attached

danger of distorting the work. This difficulty can be overcome by clamping a guide strip to the lower jaw with a toolmaker's clamp, as illustrated in Fig. 9. If the guide projects beyond the edge of the work, the material can easily be held accurately in position throughout the shearing operation



Right—Fig. 9. Method of securing a guide-bar to the bench shears

A Improved News Sheet

We have received ■ copy of the first issue of ■ new News Sheet produced for circulation among the members of the Malden and District Society of Model Engineers. It is a great improvement upon the old ones, although its style remains generally unchanged, in that it is ■ typed and duplicated sheet. For the present, it is to be issued bi-monthly, but it will continue the object of its predecessors by circulating club news to all members.

We are pleased and interested to note that considerable progress has been made with the erection of the new headquarters at Thames Ditton —a purely voluntary effort on the part of a small team of energetic members. The walls are up, the floors are laid and the roof is well on the way to completion. If further help from the members can be organised, the interior decoration and equipment of the workshop portion should soon be well under way. The importance and convenience of ■ clubroom of this kind cannot be other than paramount to its owners, and we hope that nothing will impede its rapid completion.

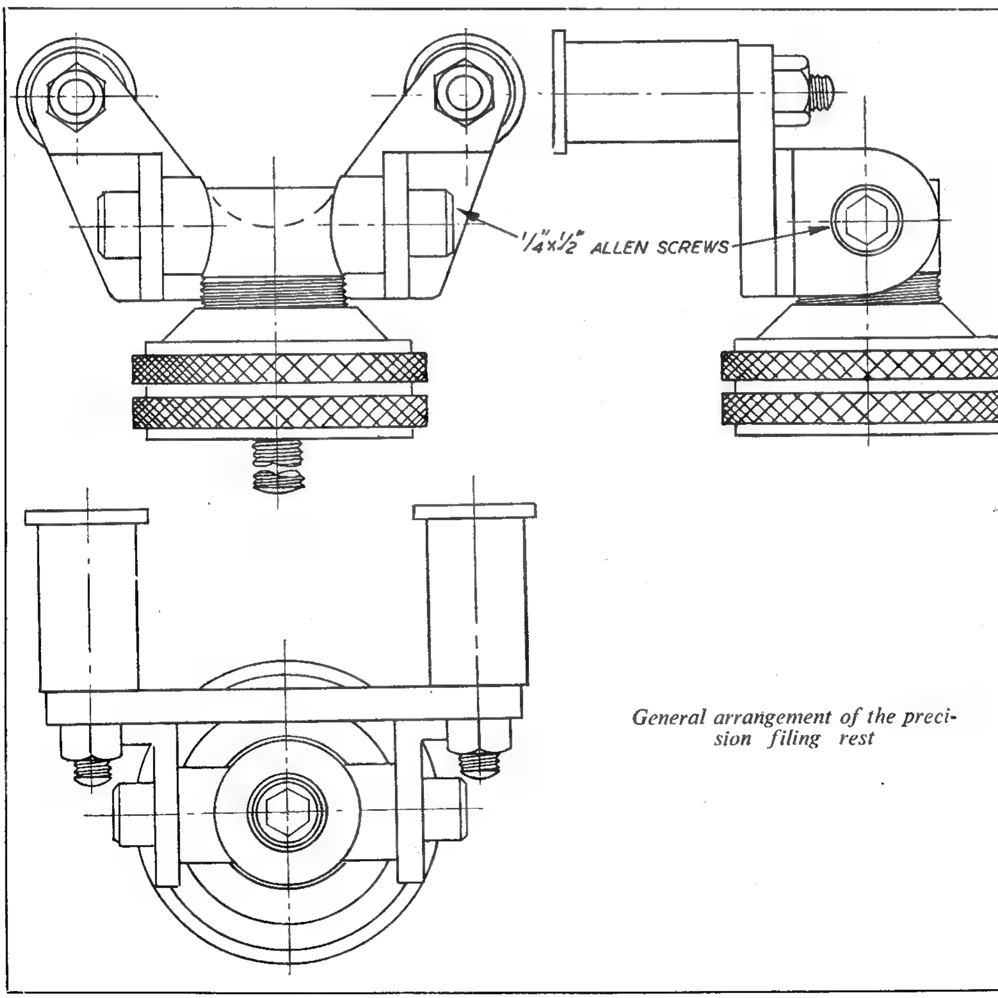
A SIMPLE PRECISION FILING REST

by H. E. White, B.Sc.

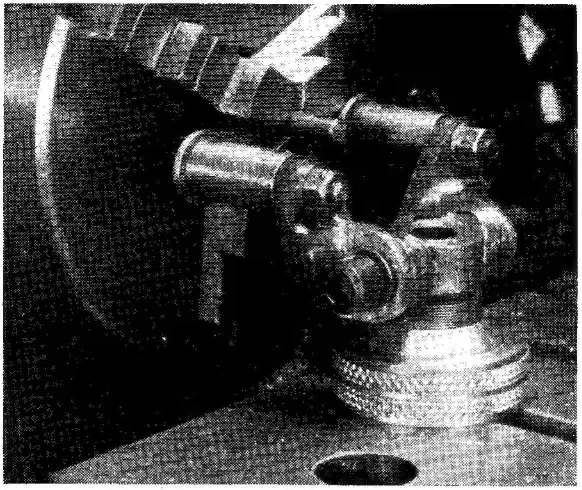
THIS filing rest was made in rather a hurry because it was wanted urgently for a particular repetition job; the design may reflect this in some ways, but I hope that the saving in time alone is sufficient justification for it, despite its faults. The main principle of the design is the result of a suggestion by my good friend, Mr. L. H. Sparey, whose ideas on the subject of lathe accessories are always worth listening to. The essential feature is the provision of a supporting post for the actual filing rest assembly, which is of the usual double roller type. This post is capable of fine precision adjustment for height, which is achieved by screwcutting a 40 t.p.i. thread on the post. The height of the rest can be set by means of a screwed base-collar which is indexed so that correct variations of height of 0.001 in. or less can easily be obtained. The attachment was actually designed to fit on the cross-slide of a Myford M.L.7 lathe, but the dimensions given could be modified to suit any ordinary lathe.

The Post

This is made from a short length of $\frac{3}{4}$ in. dia. B.M.S. rod. After its ends have been faced and

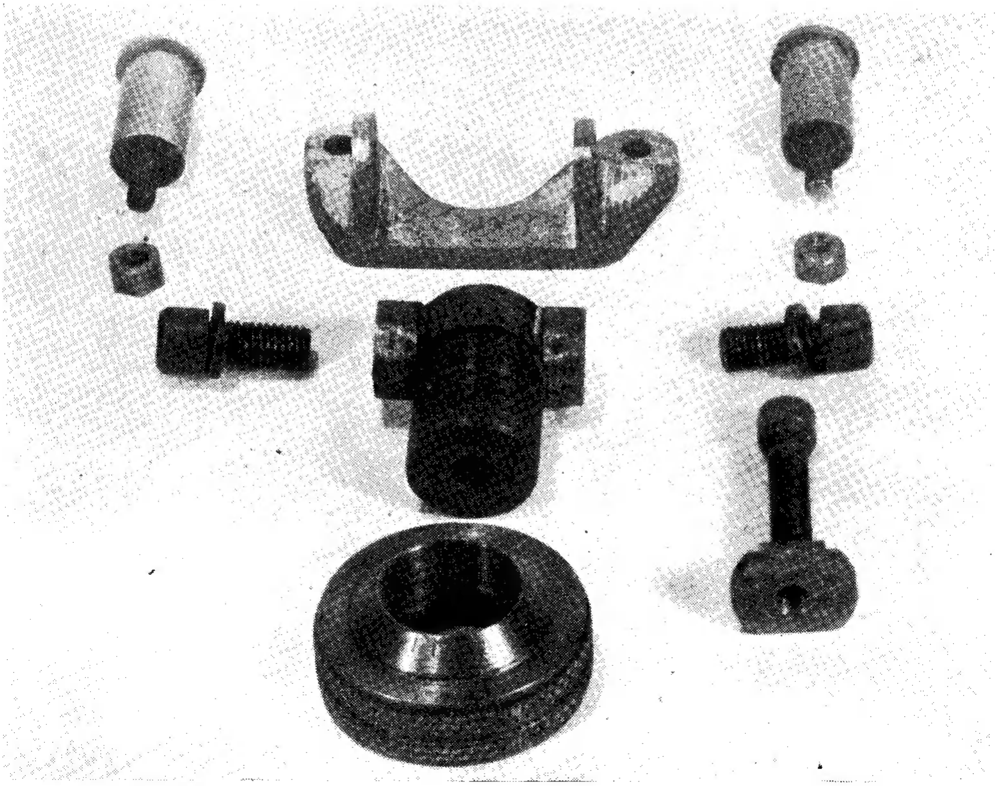


General arrangement of the precision filing rest

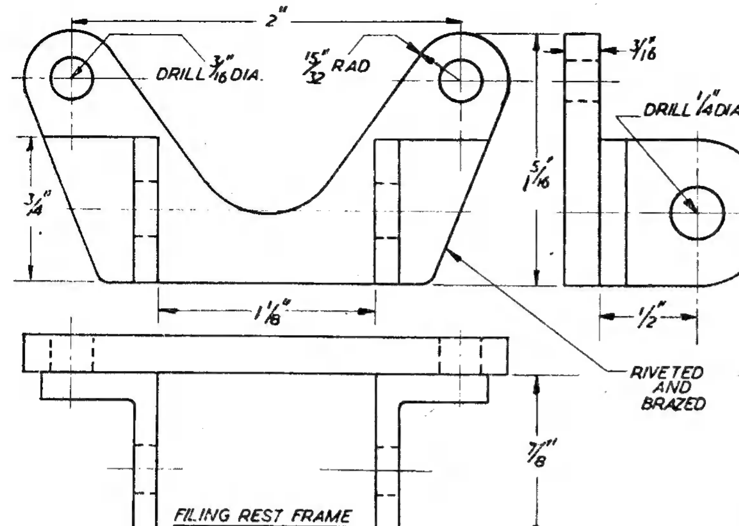


The filing attachment mounted on the cross-slide of an M.L.7 lathe. Note that the rest has been set at a slight angle to form a tapered square on the rod in the chuck

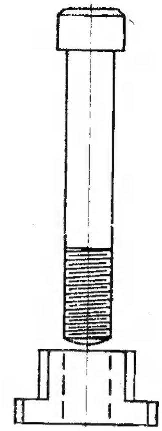
centre-drilled, it is mounted in the chuck, or between centres, and screw-cut 40 t.p.i. for a length of $\frac{3}{4}$ in. The upper end is then cross-drilled $\frac{3}{16}$ in. Two lugs, parted off from a length of $\frac{1}{2}$ in. dia. B.M.S. rod are drilled $\frac{3}{16}$ in., and recessed with a half-round file to fit the post. The two lugs are held in position with a piece of $\frac{3}{16}$-in. steel rod, riveted over at each end, and brazed or silver-soldered on. All that now remains is the drilling. First, mount the post in the chuck, using a wrapping of thin copper or brass sheet to protect the thread, and drill right through with a letter F drill, which will give a clearance hole for a $\frac{1}{4}$ in. bolt. This hole is counter-bored $\frac{3}{8}$ in. for a depth of $\frac{1}{4}$ in. If you have no counterbore, or do not wish to set up a boring tool, do this job with an ordinary drill, drilling a little short of the required depth and finishing off the hole with an end-mill or D-bit. Next, mount one of the lugs in the chuck and cross-drill right through both lugs with a No. 5 drill, tapping size for $\frac{1}{4}$ in. B.S.F. If there is any doubt about the "truth" of the end faces of the lugs, they may be faced off in the lathe by mounting one lug in the chuck and facing off the other, using very light cuts



The components of the filing rest



FILING REST FRAME

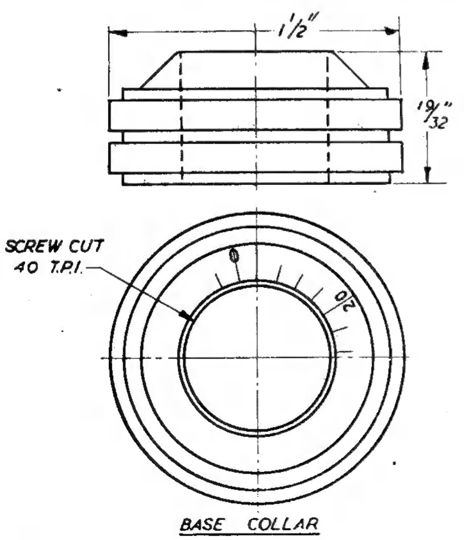


HOLDING DOWN BOLT 1/4" X 1 1/2" ALLEN SCREW AND T-SLOT NUT

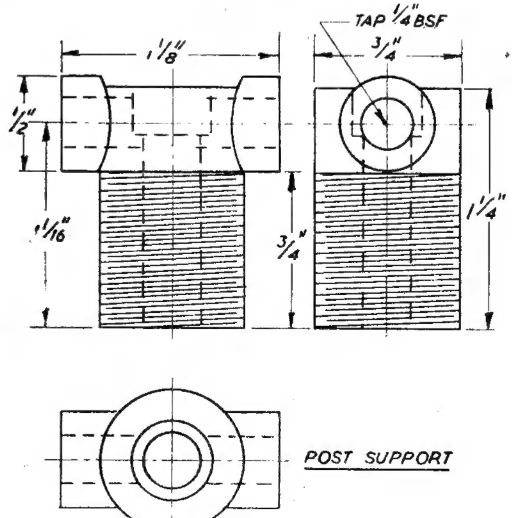
with a freshly sharpened knife tool. Finally, tap the cross-holes $\frac{1}{4}$ in. B.S.F.

The Base Collar

This is turned from a length of $1\frac{1}{2}$ in. B.M.S. rod, which is mounted in the chuck with about 1 in. projecting. Drill and bore out to 23/32 in. diameter for a depth of $\frac{3}{4}$ in., and counterbore the inner end of the hole with a small boring-tool to provide clearance for the screwcutting tool at the end of its run. Screwcut the hole, using the screwed post as a gauge, until the thread of the post is a snug fit. It is advisable to allow a little tightness in this fit, as this will probably disappear when the thread is "run in" a little, and the slight roughness left by the tool wears off. Now set the top-slide over to 45 deg. and chamfer the collar for indexing, as shown in the drawing. The indexing is carried out next, using a pointed tool mounted on its side in the toolpost, and dividing by means of a 50-tooth wheel mounted on the outer end of the mandrel. Twenty-five divisions are required, each one corresponding to 0.001 in. rise or fall. The division-lines are 1/10 in. long, and every fifth line is twice this length. At each of the longer division-lines it is very useful to provide numbers, to facilitate setting the collar. The numbers used were made by a set of punches, and are $\frac{1}{16}$ in. high. This little refinement is not, of course, absolutely essential to the functioning of the attachment, although it adds to its usefulness, and, incidentally, its appearance, which can become a very important matter when you have to look at a thing for any length of time! Actual



BASE COLLAR



POST SUPPORT

numbers are unnecessary: there are only five numbered lines (0, 5, 10, 15 and 20) and a system of punch-dots or chisel marks would be quite satisfactory if number-punches are not available.

Now set up a parting tool and turn a parting slot at a distance of 19/32 in. from the end of the chamfered top of the collar to a depth of about $\frac{1}{8}$ in. With the same tool, shoulder down the outer diameter of the collar as shown in the drawing, and turn the medial groove. The knurling is the next job, and this must be done before the collar is finally parted off from the stock, because a very rigid mounting is necessary for the knurling process. When both the ribs have been satisfactorily knurled, part off the collar from the stock and, if necessary, face up the base truly, in case the parting tool has wandered.

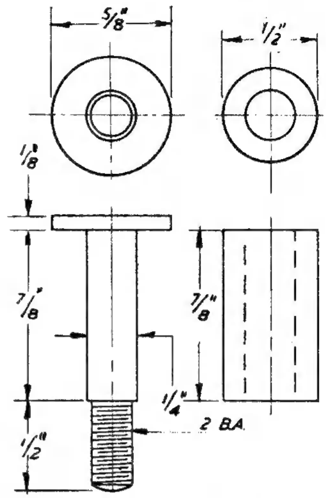
The Filing Rest

The frame of the rest is cut from a piece of $\frac{3}{16}$-in. mild-steel plate to the outline shown in the drawing. Two $\frac{3}{16}$ in. holes are drilled to take the roller-pins, and two brackets, cut from $\frac{3}{4}$ in. $\times$ $\frac{1}{8}$ in. angle steel are lightly riveted in position and then securely fixed by brazing. As a matter of fact, a spacing jig-piece was bolted between the two brackets before they were riveted and brazed, to ensure that the bolting faces were the exact distance apart, and perfectly parallel at the end of the brazing process, a little precaution which saved time in the end.

The two rollers were parted off from $\frac{1}{2}$ in. dia. silver-steel rod, drilled, reamed, and hardened right out. The pins were turned from $\frac{5}{8}$ in. dia. mild-steel rod and case-hardened. The attachment of the filing rest to the post in this manner allows the rollers to be inclined at any desired angle, and provides for the forming of tapered squares or hexagons—a useful point when it is desired to fit a square-holed component tightly to a square shank.

Attachment to Cross-slide

The post is held to the cross-slide of the lathe with a $\frac{1}{4}$-in. Allen cap-screw, which at the same time locks the adjusting base collar. A T-slot



Roller pins (2 *off*) *Roller, silver-steel* (2 *off*)

nut must be filed up from a piece of mild-steel bar, making sure that it is symmetrical, and grips equally on both sides of the T-slot. No dimensions are given for this, as its size will obviously depend upon the size of the T-slots.

OLD LATHES

Mr. T. Lees writes:—"I was interested in Mr. G. W. Whitworth's letter about old Whitworth lathes ('M.E.,' December 27th, 1951).

"In the general turning shop at the Hartford works of Platt Bros. & Co. Ltd., Oldham, where I am employed, there are two old Whitworth lathes still in use.

"The oldest of these two lathes was built in 1846 and the maker's number is 146. It is about 9 in. centres, and will take about 12 ft. between centres. It has the central leadscrew and is backgeared, the drive being by a four-step cone pulley to a two-speed countershaft, thus 16 spindle speeds are obtainable. Hand traverse to the saddle is by means of a pinion which is rolled along the leadscrew, and connected via bevel gears to a shaft running across the saddle, one end of this shaft being squared to receive a loose handle. The slide rest is of the type found on most very old lathes. A slide, which resembles the top-slide of a more modern machine, is mounted on the saddle, and is arranged to swivel; this carries another slide fixed at right angles to it, therefore the top-slide is used to put on the feed. There is no provision for power surfacing. This machine is only used occasionally, but by all accounts it can still work to reasonable limits.

"The other lathe is used regularly, mostly for sliding long shafts between centres. It is in very good condition, and was rebuilt by Platts in 1949. It carries the maker's number 276 but no date of manufacture. The centre height is 12 in., and it will take about 20 ft. between centres. This lathe has also a central leadscrew, and is backgeared, the drive is by a four-step cone from a two-speed countershaft. The 'stang' for shifting the belt is in the form of a shaft running the full length of the bed. The leadscrew on this machine is also used as a rack for the hand traverse, in the same manner as described for the 9-in. lathe. The saddle carries the normal type of cross-slide, which is fitted with a swivelling top-slide. On the top-slide are mounted two small independent toolslides. Fixed at the back of the saddle is another cross-slide, which carries a top-slide, thus it is possible to put on three cuts at once. There is no power surfacing gear. There are also one or two screw-cutting lathes of about 9 in. centre height, which were built by Platts in 1855, still going strong."

PRACTICAL LETTERS

Signal Cannon

DEAR SIR,—I have been asked to make a signal gun (cannon) for a yacht club.

There used to be, and maybe still is, such an article commercially available ; from memory, it was a breech-loading gun and used a 12-bore blank cartridge. I wonder if any of your readers could help me by giving some particulars of the breech mechanism, firing arrangements and extractor gear. Any information bearing on the subject would be most gratefully received.

Yours faithfully,
Wealdstone. K. N. HARRIS.

Musical Boxes

DEAR SIR,—I have for many years been keenly interested in musical boxes, musical clocks, clockwork singing birds and automata ; consequently, I have read with great interest the references and correspondence on the subject of musical boxes which have appeared recently in your columns.

Articles on this most fascinating subject are occasionally to be found in your contemporaries and it is interesting to note that an article on the repair of music boxes, by Glenn P. Heckert, appeared in the December issue of the *Horological Journal.*

There are, however, a few books on this subject, and many horological works contain some reference to musical boxes. As some of these volumes may not be known to your interested readers, it is felt that a short bibliography, appended below, of the more important books and references may not prove amiss.

Britten. The Watch and Clockmaker's Handbook, Dictionary and Guide (see under heading " Musical Boxes," pp. 310-313 in 14th ed.). A short article containing much useful information on repairs and gives some of the illustrations and information from the article appearing in " Workshop Receipts " by the same publishers.

Chapuis and Droz. Les Automates, figures artificielles d'hommes et animaux. 436 pp. Neuchatel, 1949.

Chapuis and Gelis. Le Monde des Automates. Two vols. Paris and Neuchatel, 1928.

The last two mentioned works are masterpieces and very fine productions containing many references to musical boxes, etc., but, unfortunately, are very expensive and scarce items.

Clark. Musical Boxes. 72 pp. Birmingham, 1948.

Mainly historical and contains much useful data respecting serial numbers and " dating " a musical box.

Jacot and Son. How to Repair Musical Boxes. 32 pp. New York, 1890.

A small booklet including a most valuable illustrated catalogue of parts and material.

Mosoriak. The Curious History of Music Boxes. 242 pp. Chicago, 1943.

Includes " The Care of a Music Box," pages 196-233, by Glenn P. Heckert. This article constitutes the most complete information to be found on the subject of repairs, marred only by the low standard of the drawings to illustrate the article, which do tend to detract from an otherwise finely produced book.

Spon. Workshop Receipts. Volume III (see under " Musical Boxes," pp. 200-207).

A very useful article on repairs with several illustrations.

Readers in the Birmingham area are fortunate in that most of the above-mentioned works are to be found in one or other department of the Birmingham Reference Library, with the exception of two works only, viz. *Le Monde des Automates* (Chapuis and Gelis), and the booklet by Jacot and Son.

Adding the usual disclaimer, I would mention that readers interested in the acquisition of the above works would be wise to communicate with Malcolm Gardner, Horological Bookseller, 12, Earnshaw Street, St. Giles, London, W.C.2.

I look forward to reading further articles and correspondence concerning musical boxes and automata in your journal ; in particular, I would be pleased to learn if any reader has made any of the little hardened steel " endless screws " which carry the governing fly, and his mode of procedure. It is my intention, when I have the time to make the small milling cutter necessary, to treat it as a small thread-milling job and hardening, tempering and polishing afterwards, taking all possible precautions to minimise distortion under heat treatment.

Yours faithfully,
Birmingham. J. L. HAMMOND.

Curved Flywheel Spokes

DEAR SIR,—I have read Mr. H. W. M. Beck's letter, published January 10th, 1952, on the subject of curved flywheel spokes, with considerable interest, but I must point out that one of his statements is seriously in error—it runs as follows :—

" It is perhaps significant that curved spokes were essentially heavy gas and oil engine practice —*never to be seen in old steam engines.*" (My italics.)

The italicised phrase is quite wrong—many of the early Fowler ploughing engines had curved spokes to the flywheels. Other examples, before me as I write, are contained in a Davey, Paxman catalogue of 1909, which shows many types of steam-engine—horizontal, vertical, horizontal girder-type, high-speed vertical (simple and compound), etc.—all fitted with curved spoke flywheels.

I could also quote other makers, but the two examples mentioned above will suffice to show that one cannot afford to be dogmatic when talking about that most fascinating of all prime movers, the steam engine.

Yours faithfully,
Sheffield. W. J. HUGHES.